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ABSTRACT

This report presents estimates of the prevalence of heart and other circulatory conditions of children and youths age 6 through 17 years in the noninstitutionalized population of the U.S. Estimates are based on diagnostic impression data from the direct, standardized examination findings of the Health Examination Surveys among national probability samples representative of the 23.8 children age 6 through 11 years in 1963-65 and of the 22.7 million youths age 12-17 years in 1966-70. Findings are analyzed by age, sex, race, geographic region, urban-rural residence, annual family income, and in relation to other findings. Among children, about 570,000 have a significantly abnormal heart or other circulatory condition. Among youths, more than 1 million have a significant cardiovascular condition. Among children nearly three-fourths of these conditions are considered congenital, while among youths nine percent are considered congenital. The prevalence of cardiovascular conditions is higher among Negro children and youths than among white groups, higher among those living in the South or in rural areas, and higher among the unschooled and poor. Survey data are presented in 15 tables. Statistical notes, definitions of demographic and socioeconomic terms, and medical history and physical examination forms are appended. (Author/RH)

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Cardiovascular Conditions of Children 6-11 Years and Youths 12-17 Years

United States, 1963-1965 and 1966-1970

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Cardiovascular Conditions of Children 6-11 Years and Youths 12-17 Years

United States, 1963-1965 and 1966-1970

Prevalence of heart and other circulatory conditions of children and youths in the United States as determined from standardized examination (diagnostic impression) findings and medical history, by age, sex, race, geographic region, and socioeconomic background as well as in relation to other selected findings from the Health Examination Surveys of 1963-1965 and 1966-1970.

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In accordance with specifications established by the National Center for Health Statistics, the Bureau of the Census, under a contractual agreement, participated in the design and selection of the sample, and carried out the first stage of the field interviewing and certain parts of the statistical processing.

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SYMBOLS

Data not available	...
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision	*

CARDIOVASCULAR CONDITIONS OF CHILDREN AND YOUTHS

Jean Roberts, *Division of Health Examination Statistics*

INTRODUCTION

This report presents estimates of the prevalence of heart and other circulatory conditions, known and previously unknown, of children and youths age 6-17 years in the noninstitutionalized population of the United States. These are based on diagnostic impression data from the direct, standardized examination findings of the Health Examination Surveys among national probability samples representative of the 23.8 million children age 6-11 years in 1963-1965 and of the 22.7 million youths age 12-17 years in 1966-1970. Findings are analyzed by age, sex, race, geographic region, urban-rural residence, annual family income, and in relation to some other findings from the medical history and the physical examination.

The Health Examination Survey is one of the major programs of the National Center for Health Statistics authorized through the National Health Survey Act of 1956 for the determination of the health status of the population as a continuing Public Health Service responsibility.[1]

The principal health survey programs of the National Center for Health Statistics include the Health Examination Survey, Health Interview Survey, Health Manpower and Facilities surveys, and Health Resources Utilization surveys, in addition to those of Vital Statistics. The Health Interview Survey, which collects health information from samples of people by household interview, primarily studies the impact of known illness and disability on the lives of people. The Health Manpower and Facilities programs obtain information through surveys of hospitals, nursing homes, other resident institutions, and the entire range of personnel in the health occupations. The Health Resources Utilization surveys obtain information on the extent of health facility and service utilization. In the Health Examination Survey, data are collected by means of direct physical examinations, tests, and measurements performed on carefully selected nationwide probability samples of the population. This latter system, in addition to providing the most efficient way of obtaining actual diagnostic data on the prevalence of specified medically defined illness, is the only one of the survey programs to secure information on unrecognized or undiagnosed conditions as well as on a variety of physical, physiological, and psychological measures within the population. Medical history, demographic, and socioeconomic data are also obtained on the sample population under study, making possible the interrelation of these data with the examined findings for those examined.

The Health Examination Survey is planned as a continuous series of separate programs called "cycles." Each cycle is limited to certain aspects of health within specified segments of the U.S. population. The first cycle in 1960-1962 was designed primarily to provide data on the prevalence of certain chronic diseases and on the distribution of various physical and physiological measures in a defined adult population.[2,3]

This report is based on findings from the two programs of the Health Examination Survey

that followed the first cycle. For the second cycle (1963-1965), a probability sample of the noninstitutionalized children 6-11 years of age in the United States was selected and examined. In the third cycle (1966-1970), a similarly designed probability sample of the noninstitutionalized youths 12-17 years of age in the United States was selected and examined. The two programs were developed to obtain basic measures of growth and development as well as data on other health characteristics for the entire continuum of childhood through adolescence. The questionnaire and examination content and procedures were specially designed for each of the two age groups, taking into account the differences in the health, mental, and behavioral characteristics of children and youths. The examinations include those given by a pediatrician who was assisted by a nurse, those given by a dentist, tests administered by a psychologist, and a variety of tests and measurements by laboratory X-ray technicians. The survey plan, sample design, examination content, and operation of these surveys have been described in previous reports.[4,5]

Field collection operations for the children's cycle started in July 1963 and were completed in December 1965. Of the 7,417 children selected in the sample, 7,119, or 96 percent, were examined. This national sample closely represents the 23.8 million noninstitutionalized children 6-11 years of age in the United States with respect to age, sex, race, geographic region, population size of place of residence, and rate of population change in size of place of residence from 1950 to 1960.

In the youths' cycle, data collection began in March 1966 and was completed in March 1970. For this program, 7,514 youths were selected in the sample, and 6,768, or 90 percent of them, were examined. This national sample closely represents the 22.7 million noninstitutionalized youths 12-17 years of age in the United States with respect to the same characteristics as those indicated for the children's survey. The sample design for the youths' survey provided for use of the same sampling areas and housing units used in the preceding survey among children. As a result, nearly one-third of the youths in that study had previously been examined in the children's survey. The time lapse between the two examinations ranged from 28 months to 5 years; median time lapse was about 4 years.

In each of these survey programs, examinations were conducted consecutively in 40 different locations throughout the United States. During the single visit, each child or youth was given a standardized examination by the examining team in the mobile units specially designed for use in the survey. During the third cycle only, girls whose urine specimens were found to have bacteria on culture were brought back for repeat urine tests. Prior to the examination, demographic and socioeconomic data on household members as well as medical history, behavioral, and related data on the child or youth to be examined were obtained from the parents. In addition, a Health Habits and History form (appendix III) was also completed by the youth before he arrived for the examination and a Health Behavior form was completed by him while in the examination center. Ancillary data were requested from the school attended by the child or youth which included grade placement, teacher's rating of behavior and adjustment, and health problems known to the teacher. A birth certificate was obtained for each child and youth to verify age and to obtain information relative to condition at birth. Statistical notes on the sample design, reliability of the data, and sampling and measurement error are shown in appendix I.

DATA SOURCES

Medical History

Children.—At the time of the initial visit to the sample household, an interviewer from the U.S. Bureau of the Census left with the parents a self-administered Medical History form (appendix III) for each eligible child. This form was picked up about a week later by the Health Examination Survey representative, who reviewed it and assisted the parents in completing any incomplete or inconsistent entries.

The questions from the Medical History considered in this report were whether the child ever had rheumatic fever, a heart murmur, or

anything else wrong with the heart; whether exercise is now restricted; whether the child takes any medication regularly; present health status; and whether there is anything about the child's health that bothers or worries the parent.

Youths.—The Medical History for youths obtained from the parent during the 1966-1970 survey was self-administered. Only the questions on whether the youth ever had a heart murmur or anything else wrong with the heart, the most serious illness if rheumatic fever, present health status, regular use of medication, and whether the youth's exercise was now restricted were considered in this report.

The Health Habits and History form was left in the household at the time of the Health Examination Survey representative's visit with instructions that it be completed by the eligible youth and returned to the survey before the youth came in for the scheduled examination. From this questionnaire, the only questions used were the ones on whether or not the youth's exercise was now restricted, present use of medication, and present health status.

Physical Examination

Children.—The examining physician with the survey team was either a senior resident or fellow in pediatrics who had been given special training in the standardized physical examination used in the survey. The Medical History filled out at home by the parent or guardian for each child was available for review on the night before the examination. Although it was recognized that this might tend to bias the examiner's findings, information was needed at the outset both regarding limitations in the child's ability to perform any of the tests or procedures in the examination and regarding conditions which might require further followup during the examination. The examination was done according to predetermined standardized procedures; there was no subsequent examination to clarify the initial diagnostic impression.

The purposes of the physical examination were: (1) to identify examinees considered normal within the limitations of this examination; (2) to detect acute conditions which might affect other parts of the examination; (3) to identify, insofar as possible, examinees with heart disease and neurological, muscular, and joint conditions, the major results of accidents or injuries, and observable congenital malformation; and (4) to detect fever, asthma, epilepsy, and any other condition the examining pediatrician considered a contraindication to exercise.

The physician recorded his findings based on his own best judgment and medical skill, without attempting to "compensate" for lack of followup. As a result, the cases that were "overdiagnosed" (relative to what might be revealed by more followup evaluation) may have been to some extent offset by cases that were, in the same terms, "underdiagnosed."

Included in the pediatrician's examination was an assessment of the general appearance of the child with respect to tics, mannerisms, and physical deformities; tests of the general functioning and other abnormalities of the joints and muscles; a limited neurological and cardiovascular examination; and an examination of the eyes, ears, nose, and throat.

The cardiovascular examination included the pediatrician's listening for and recording a detailed description of the heart sounds and any murmurs, innocent as well as significant ones. The examiner classified these murmurs as "innocent," "suspect significant," or "definite significant." Only sounds and murmurs supported by other evidence of abnormality were classified as "suspect" or "definite significant." Examination protocol specified that innocent murmurs were to be those which became less audible or disappeared completely when the examinee changed from the supine to the upright position or during various phases of respiration. Not to be included in the findings of murmur was a venous hum—the soft humming sound heard in the anterior part of the upper chest in systole or diastole which could be made to disappear or be slightly exaggerated by changing the position of the head or by light compression over the jugular vein.

Thrills were identified, if present, as to whether evident during systole or diastole and whether at the base or apex of the heart. In the examination, this identification was made by palpation with the hand and then listening with a stethoscope over the cardiac area of the chest,

first while the examinee was sitting, leaning forward, and with breath held in full inspiration, and again later when the child was lying on his left side.

The point of maximum impulse (PMI) of the heart beat was determined with the examinee in the supine position. The examiner recorded the intercostal interspace at which the PMI was located and whether within, at, or outside the midclavicular line.

The nurse routinely obtained an electrocardiogram (EKG), monitored by the physician. The physician recorded whether the EKG was normal or abnormal.

The physician also scanned the chest X-ray taken by the survey technician and recorded whether or not possible cardiac pathology was evident.

At the time of the examination, the survey pediatrician also obtained more specific information from the examinee on known history of cardiovascular pathology.

The physician's diagnostic impression of heart disease was recorded together with whether the condition appeared to be congenital or acquired and the type of abnormal findings on which the impression was based—history, thrill, murmur, EKG, X-ray, or other.

Youth.—The examining physician with the youth survey team was either a senior resident or fellow in either pediatrics or adolescent medicine from selected medical centers, schools, or hospitals, who had been given special training in the standardized physical examination used in the survey.

On the day before the scheduled examination, the Medical History of Youth form completed by the parent and the Health Habits and History—Youth form completed by the youth were reviewed by the examining physician, who paid special attention to any entries suggesting a limitation on the youth's ability to perform any of the tests or procedures and to items which might require further followup in the course of the examination.

The physician's examination included an eye, ear, nose, and throat examination, check for goiter, musculoskeletal and neurological evaluation, cardiovascular examination, grading of facial acne, assessment of sexual maturation on a 5-point scale, and an appraisal of nutrition. During the examination, the nurse drew a sample of blood (later used to determine hematocrit and hemoglobin levels, levels of choiesterol, concentration of uric acid, presence or absence of syphilis on serological tests, testosterone levels in boys, amounts of protein-bound iodine, and genotype of blood groups), obtained the three blood pressure readings (supine before the examination and in both supine and sitting positions after the physician's examination), and for the female examinees completed the menstrual history questionnaire and collected a urine specimen for culture of bacteria.

The cardiovascular examination included routinely the listening for heart sounds while the examinee was sitting and then when supine. Palpation for thrills and the PMI were performed with the examinee supine. The examining physician recorded location of the PMI of the heart with respect to the intercostal interspace and midclavicular line, the absence or presence of thrills and, if present, whether those thrills were systolic or diastolic and whether they were heard at the base or apex, description of abnormal first and second heart sounds, description and classification of murmurs as "significant," "possibly significant," or "innocent," and description of other abnormal cardiovascular findings. Electrocardiograms and chest X-rays were taken routinely and available to the pediatrician for use in making his diagnostic impression, but no separate record was consistently made of whether the findings for either were interpreted by him as abnormal, nor was any routine record made of additional information on known cardiovascular condition obtained at the time of the examination, as in the record for children. Hence, it is not possible to determine among the youth group the extent to which the diagnostic impression was supported by these specific findings, as can be done for the children. However, the medical examiners in Cycle III were specifically asked to make the best possible decision using all the information available at this one visit in distinguishing between significant (suspect or definite) and innocent murmurs.

Quality Control

To insure skillful examinations by the staff physician and standardization of observations among the many different physicians employed during the course of the survey, two specific training methods were employed. The senior medical advisers of the Health Examination Survey trained the physicians who were to administer the standardized physical examination. Then during the first several days of examinations at a location where a new staff physician was in attendance, the senior medical advisers were present to review procedures, to perform replicate examinations, and to reduce to a minimum interobserver variation in the various components of the physical examination and reporting.

The proportion of children with significant cardiovascular findings on examination ranged from 0 to 9.0 percent among the 36 pediatrician examiners in the survey compared with 0 to 23.5 percent among youths examined by the 41 medical examiners, when the effect of age-sex differences within each of the two groups is controlled. Further information on the extent of examiner variability in the diagnostic impression data from these two surveys is included in appendix I.

Ten to fifteen youths selected at random from among those scheduled for examination in the first week, at each of the 40 examination locations throughout the country were also scheduled for a repeat examination 2 to 4 weeks later at the same location and usually by the same examiner. In all, replicate examinations were obtained for 302 youths, or 4.5 percent of all youths examined. Comparison of the findings (shown in table A) from the original and replicate examinations during the survey provided the senior medical advisers the basis for identifying areas in which further quality control or retraining was needed.

Among those 302 youths examined twice, 83 percent (251 of 302 youths) were rated the same on both examinations—essentially normal, without significant cardiovascular findings, or with significant cardiovascular findings. The level of agreement on significant cardiovascular findings from the two examinations was 36 percent (9 of 25 youths with such findings on both).

Table A. Diagnostic impression regarding cardiovascular findings among youths age 12-17 years from regular and replicate examinations: Health Examination Survey, 1966-1970

Diagnostic impression—regular examination	Diagnostic impression—replicate examination			
	All findings	Significant cardiovascular findings	No significant cardiovascular findings	Essentially normal
	Number of youths			
All findings	302	18	49	235
Significant cardiovascular findings	18	9	1	6
No significant cardiovascular findings	55	2	33	20
Essentially normal	231	7	15	209

FINDINGS

General Prevalence

Among noninstitutionalized children age 6-11 years in the United States, an estimated 2.4 per 100, or about 570,000, have a significantly abnormal heart or other circulatory condition (diagnostic impression). Among noninstitutionalized U.S. youths age 12-17 years, the corresponding rate is nearly double—4.6 per 100—or more than 1 million with a significant cardiovasular condition (diagnostic impression) (table 1).

These national estimates are based on direct examination findings from the Health Examination Survey of 1963-1965 among a national probability sample of children and that of 1966-1970 among a national probability sample of youths. Summary findings from the examination and health histories with comparisons of the general methods used in the two surveys have been published.[6] More specific information

on the protocol for the cardiovascular parts of the examinations is included in the section "Data Sources" of this report. The significant cardiovascular findings are, as indicated, limited to diagnostic impressions from the single examination without the more detailed examination or followup that might be needed for a definite diagnosis. These findings are described in considerable detail so that the reader will have a basis for understanding the extent of comparability or lack of it between the two examinations.

The trend in the prevalence of cardiovascular conditions is not consistent across the 6-17-year age range. The cardiovascular rates are slightly higher at 6-8 years (2.5-2.8 per 100) than at 9-11 years (2.0-2.3 per 100), then increase steadily from 2.3 per 100 at 11 years to 5.6 per 100 at 14 years. Among youths, the rates are consistently nearly double those among children; they range from 3.6 per 100 at 12 years to 5.6 per 100 at 14 and 16 years (figure 1).

Among children, nearly three-fourths (71 percent) of these conditions were considered congenital; the age-specific proportions range from 57 percent at 7 years to 80 percent at 9 years but show no consistent age-related trend. In contrast and possibly indicating differences in emphasis between the two examinations, among youths, only 9 percent of these conditions were shown as congenital, and the proportions ranged from 5 percent at 16 years to 12 percent at 14 years.

The prevalence of cardiovascular conditions is slightly higher among boys than among girls in both age groups.

These diagnostic impressions and the distinction between the congenital and the acquired, as indicated previously, are based on the physical findings at the time of the examination and the survey pediatrician's evaluation of the medical history of previously diagnosed conditions as reported by the parent and examinee.

The following sections on findings from the medical history and the examination contain an assessment of the effect of differences, if any, between the two studies on these trends.

Medical History

Findings from the medical history, as given by the parent prior to the examination, show that the history of ever having had a heart murmur or something else wrong with the heart is only slightly higher among youths (4.9 per 100) than among children (4.1 per 100). (See table 1.) In comparison with present findings from the examination, the proportion of children with history of a cardiovascular condition is nearly twice (71 percent more than) the proportion with a significant cardiovascular condition as determined from the diagnostic impression at the time of the examination; among youths these proportions are nearly identical—the rate from history is only 7 percent greater than that from the present findings at examination (figure 2).

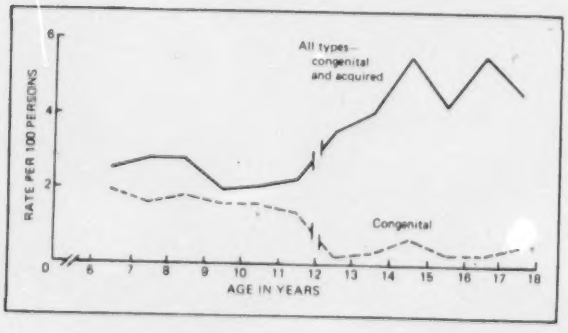

Figure 1. Prevalence rates for cardiovascular conditions, all types and congenital, from examination diagnostic impressions among children in 1963-1965 and youths in 1966-1970, by age: United States

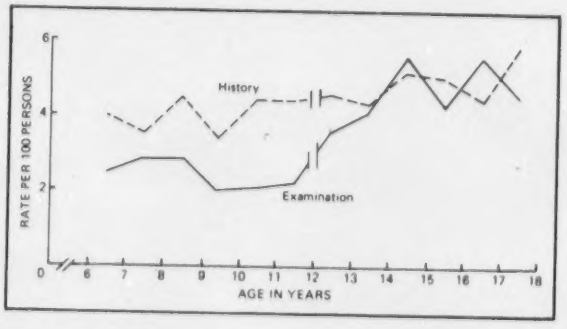

Figure 2. Prevalence rates for cardiovascular conditions from examination and history (from parent) among children in 1963-1965 and youths in 1966-1970, by age: United States

Similar to the findings at examination among both children and youths, boys were slightly more likely than girls to have been reported by their parents as having a history of a heart condition.

Information obtained from the medical history on present restriction of exercise for any reason (only one of which would be a heart condition) under doctor's orders, indicates that among youths, those with a history of cardiac condition were substantially more likely to be so restricted than those without such history; among children, the relationship to the cardiac history was less marked.

Rheumatic fever, which may impair normal functioning of the heart temporarily or permanently, was reported on history for 0.6 per 100 children and 0.9 per 100 youths. Such positive history was about as frequently reported for girls as boys and shows a general increase with age from 0.2 per 100 at 6 and 7 years to 1.6 per 100 at age 17.

Among youths whose most serious illness was rheumatic fever, about one-fourth (28 percent) had the disease before they were 6 years old and most of the rest had it during the 6-11-year period (table 2). Nearly all (90 percent) had received some medical treatment when they were sick with rheumatic fever. More than half (56 percent) were reported to have had an abnormal response to the streptococcal infection that left some residual cardiac damage. This information was not obtained among children.

Examination

Diagnostic findings.—For both children and youths, the presence and significance of heart murmurs were recorded by the examining pediatrician. The prevalence of significant or possibly significant murmurs was greater among children (3.5 per 100) than among youths (2.4 per 100); the rates were similar for boys and girls within each age group (table 3). No consistent trend with age in this rate across the 6-17-year span is evident.

In the children's examination, but not that for youths, the examiner recorded whether the EKG and chest X-ray showed evidence of cardiovascular abnormality and whether the examinee had a positive cardiac history, so that it was possible to determine the extent to which these were used in determining the diagnostic impression. Among all those age 6-11 years, 4.7 per 100 had positive EKG's, 3.1 per 100 had positive chest X-rays, and 6.2 per 100 had positive cardiac histories. For each, the proportion was slightly higher among boys than girls.

The proportion with history of a cardiac condition, as determined by the examining pediatrician after reviewing the medical history given by the parent and talking with the child during the examination, is about 50 percent higher among both boys and girls than when the determination was made based on parent reports alone. (See tables 1 and 3.)

The extent to which these positive findings were present among those with a diagnostic impression of a cardiovascular condition among children is shown in table B. Nearly 80 percent of children with significant cardiovascular conditions had a significant or possibly significant heart murmur, more than one-third (38 percent) had a positive EKG, more than one-fourth (29 percent) had a positive cardiac history, and about one-fifth (18 percent) had a positive chest X-ray. The four types of positive findings were generally absent in children with normal cardiac diagnostic impressions—the percent ranging from 98.6 percent without murmurs to 96.9 percent with negative EKG findings.

Among children with significant or possibly significant murmurs, nearly 42 percent were considered to be essentially normal, without significant cardiac pathology; more than three-fourths (77 percent) of those children with positive EKG's were considered essentially normal, as were 88 percent of those with positive history and 82 percent of those with positive chest X-rays.

The recording of the physician in the children's examinaton did not permit the identification of specific types of conditions, other than murmurs, among those with significant diagnostic impressions of cardiovascular pathology, as could be done for the youths.

In the examination among youths the examining pediatrician recorded a description of the first and second heart sounds. These sounds were later classified using the functional system described by Leatham,[7] McKusick,[8] and Nelson.[9] A further grouping of these classified heart

Table B. Percent of children age 6-11 years with or without a cardiovascular condition from diagnostic impression, by cardiovascular findings on examination: United States, 1963-1965

Cardiovascular finding	Cardiovascular condition—diagnostic impression	No cardiovascular condition (diagnostic impression)	
		Cardiac findings on examination	No cardiac findings on examination
All children in group	100.0	100.0	100.0
Murmur, significant or possibly significant	79.6	41.7	98.6
Positive EKG	38.4	77.0	96.9
Positive cardiac history at examination	29.1	88.4	98.3
Positive chest X-ray	18.0	81.5	98.1
Positive EKG and chest X-ray	13.4	---	---
Murmur (significant or possibly significant), positive EKG and chest X-ray	12.2	---	---
Murmur (significant or possibly significant), positive EKG and history (at examination)	8.7	---	---
Rheumatic fever history	4.7	---	---
Murmur (significant or possibly significant) positive history (at examination) and chest X-ray	3.5	---	---
Positive EKG, history (at examination), and chest X-ray	2.4	---	---
Murmur (significant or possibly significant), positive EKG, history (at examination), and chest X-ray	2.4	---	---

NOTE: Figures do not add to 100.0 because of substantial overlap.

sounds was then made following the *Eighth Revision International Classification of Diseases, Adapted for Use in the United States* (ICDA).[10] From this, the prevalence of various types of cardiovascular conditions among youths as identified in the diagnostic impression was determined. The four principal types of significant heart conditions among more than three-fourths of the youths were identified as significant murmurs, hypertension, septal defects (atrial or ventricular), and symptomatic heart disease (arrhythmias and heart block), as shown in table 4 and figure 3.

From this (using groupings from the ICDA classification[10]) the estimated prevalence of hypertensive heart disease among youths was 0.6 per 100 and of rheumatic heart disease 1.0 per 100 (table 3). If the latter group is limited to those with known history of rheumatic heart disease, rheumatic fever with some evidence of heart pathology, or evidence of mitral valve impairment, the prevalence rate for this type would be 0.4 per 100.

Only about 45 percent of those youths with a significant cardiovascular condition (from the diagnostic impression) showed evidence of significant or possibly significant murmur in contrast to the 80 percent among children (tables 4 and B). The examining pediatricians in the youths' study also used EKG, chest X-ray, and history, in addition to the physical evidence, in making their diagnostic impressions. However, it was not possible to determine the extent to which abnormal findings from each were present among youths with and without significant diagnostic impressions of abnormal cardiovascular conditions, as could be done for children.

The shift in the location of the PMI of the apical thrust or beat of the heart with age across the 6-17-year age range would be expected to reflect both normal physiologic development as well as the earliest possible evidence of heart enlargement.

In normal development, the heart is situated somewhat higher in the chest than it is in later years.[7] The extent of shift of the PMI from the

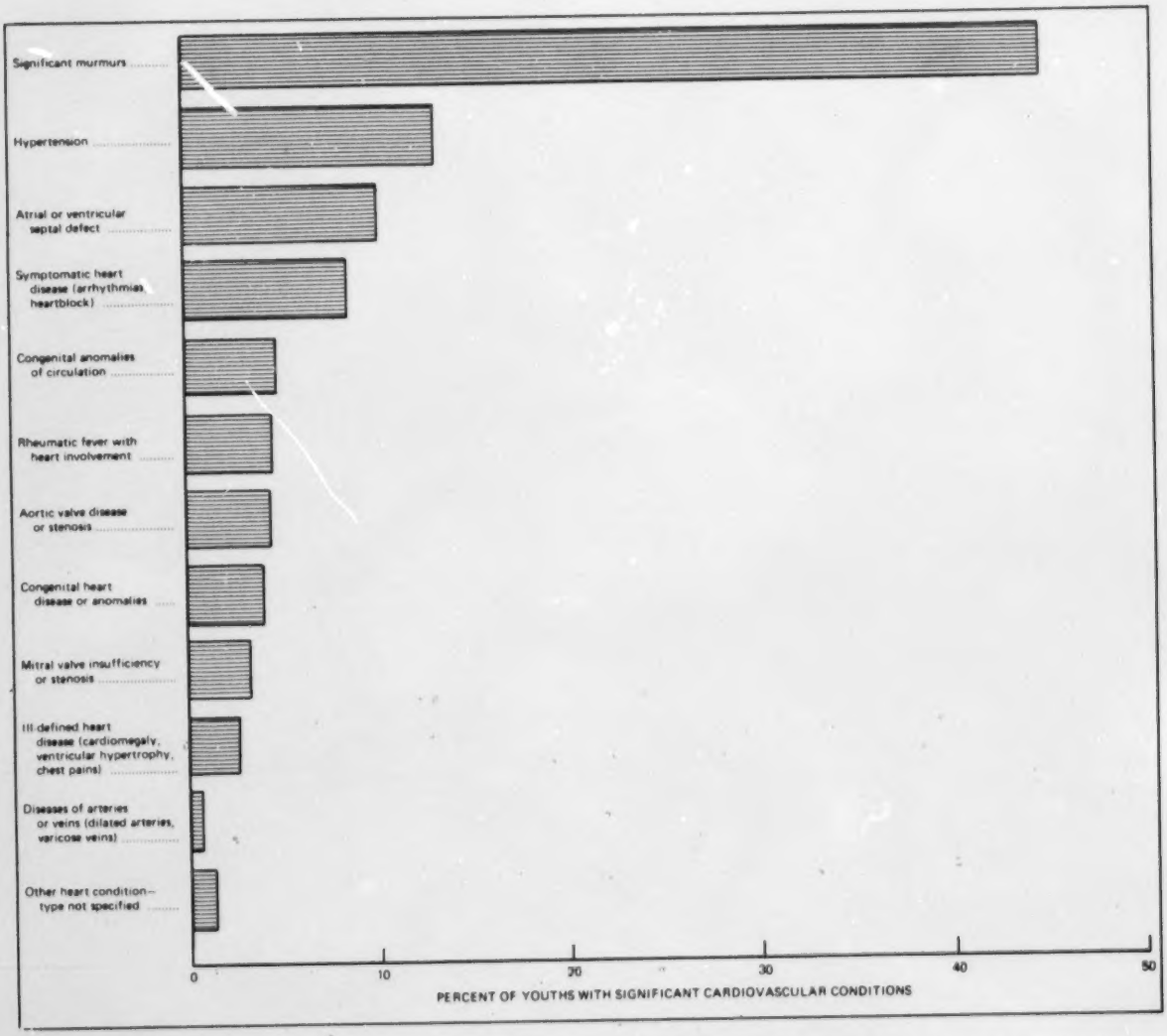

Figure 3. Percent distribution of youths age 12-17 years with significant cardiovascular conditions from diagnostic impression, by type of condition: United States, 1966-1970

fourth to the fifth interspace is clearly evident across the 6-17-year age range (tables 5 and 6 and figure 4). The proportion with the PMI of the apical beat felt in the fourth interspace generally decreased from 44 percent at age 6 years to 20 percent at age 17 years; the proportion with PMI felt in the fifth interspace increased with age among children from 56 percent at 6 years to 70 percent at 11 years; the proportion with PMI felt in the lowest position, the sixth interspace, generally increased with age among youths from 4 percent at age 12 to 11 percent at 15 years of age.

The proportion among whom the PMI of the apical thrust of the heart was felt outside (to the left of) the midclavicular line is 3 times as large among youths as among children, probably reflecting the greater heart size among the

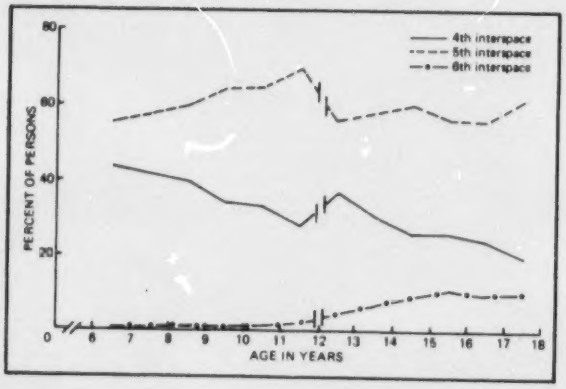

Figure 4. Percent of children in 1963-1965 and youths in 1966-1970 with point of maximum impulse of heart felt at 4th, 5th, and 6th interspace, by age: United States

youths—although the trend with age is not consistent across the 6-17-year range (figure 5, tables 5 and 6).

The true prevalence rates of cardiovascular conditions among those with specific diagnostic findings from the examination and history among children and youths are shown in table 7. The prevalence of significant cardiovascular conditions is highest among those with significant murmurs. The 90 percent of youths and 57 percent of children with significant murmurs were considered to have significant cardiovascular pathology on diagnostic impression. Among children, the prevalence of significant cardiac pathology was nearly as high among those with positive chest X-ray evidence or cardiac history as determined during the examination, as among those with significant murmurs; the respective cardiovascular rates were 50 percent and 46 percent.

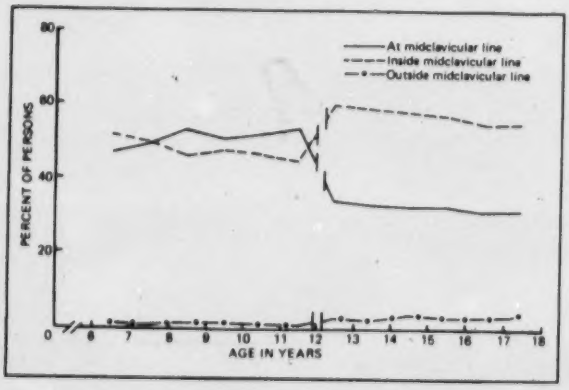

Figure 5. Percent of children in 1963-1965 and youths in 1966-1970 with point of maximum impulse of heart felt at, inside, or outside the midclavicular line, by age: United States

Blood pressure.—The prevalence of definite hypertension—that is, the adult standard of either systolic blood pressure of at least 160 mm. Hg or diastolic pressure of 95 mm. Hg or more—is very low among the 6-17-year age range of the population. National estimates from those Health Examination Surveys of 1963-1970 and the more recent Health and Nutrition Examination Surveys of 1971-1974 indicate that less than 0.1 percent of children age 6-11 years and less than 1 percent of youths 12-17 years old would have that degree of elevation of blood pressure.[11,12] From the Health Examination Survey among youths in 1966-1970 an estimated 0.6 per 100 had substantially elevated blood pressure with clinical manifestations of definite hypertension. Disturbances of the rate and rhythm of the heart and other types of cardiovascular pathology tentatively identifiable on these examinations might also be expected to be associated with lesser degrees of elevation or of depression of blood pressure levels.

Among children and youths, the mean systolic blood pressures of those with diagnostic impressions of significant cardiovascular conditions are higher than the means for those with essentially normal cardiovascular findings; the mean differences are greater among youths (9.0 mm. Hg) than among children (2.3 mm. Hg), but large enough among both age groups to be statistically significant at the 5-percent probability level (table 8 and figure 6). Mean diastolic pressures for children with and without significantly abnormal cardiovascular conditions differed no more than might be expected through chance (0.5 mm. Hg); youths with abnormal cardiac conditions had significantly higher mean diastolic blood pressures than those youths without abnormal cardiac conditions had.

Among the youths for whom type of cardiac pathology could be identified, those with clinical manifestation of hypertensive heart disease have mean systolic and diastolic pressures signifi-

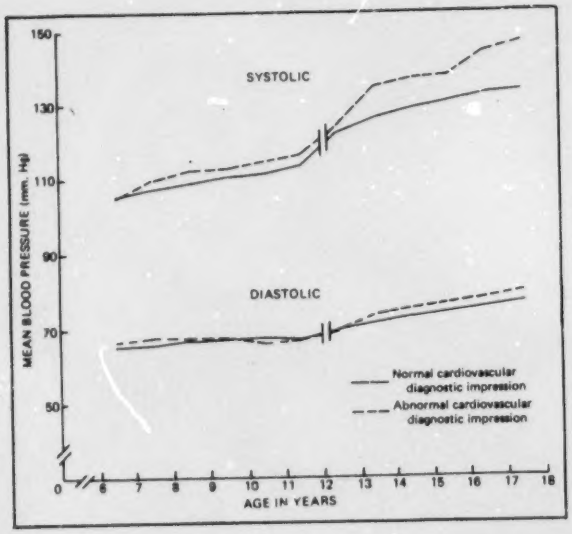

Figure 6. Mean systolic and diastolic blood pressure among children in 1963-1965 and youths in 1966-1970 with normal and abnormal cardiovascular diagnostic impressions from examination, by age: United States

cantly higher than have youths with other types of cardiac conditions or normal youths. Among youths with nonhypertensive cardiac conditions or with significant murmurs, mean systolic (but not diastolic) pressures were significantly higher than mean systolic pressures of normal youths.

Medical History-Examination

Some additional indication of the seriousness of the cardiovascular condition or the individual's or family's concern about it is reflected in the rating of the present health status by the parent for the children and youths and by the youths themselves (table 9 and figures 7-9).

Children age 6-11 years reported by their parent as being in poor health were about 6 times as likely and those rated as in fair health slightly more likely to have a cardiovascular condition on diagnostic impression from the survey examination than those reported as in good to very good health, though more than 2 percent within each health status group were found to have a cardiovascular condition. However, none of the differences in cardiovascular rates among those within the various gradations of health status were large enough to be statistically significant at the 5-percent probability level. (The respective proportions of all children in these health status groups were 0.4 percent poor, 4.9 percent fair, 42.9 percent good, and 51.8 percent very good.)[6]

Among youths age 12-17 years, cardiovascular morbidity rates for those considered in fair

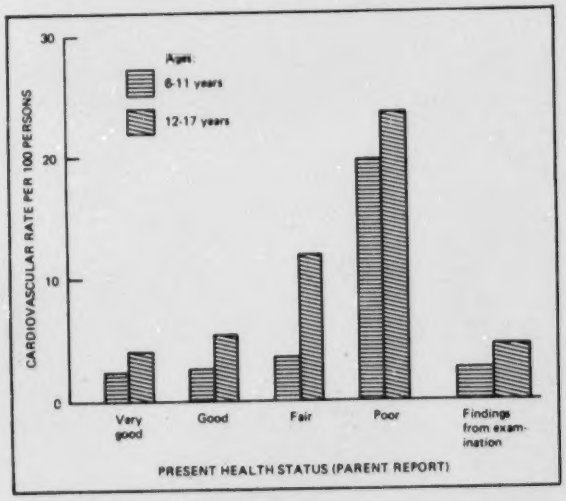

Figure 7. Prevalence rates for cardiovascular conditions from examination among all children age 6-11 years in 1963-1965 and youths age 12-17 years in 1966-1970 and by parents' ratings of their present health status: United States

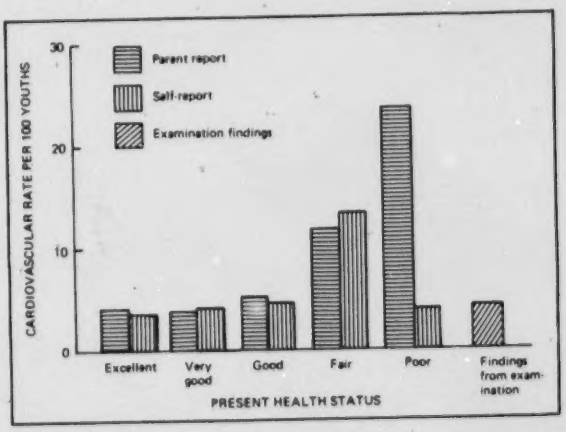

Figure 8. Prevalence rates for cardiovascular conditions from examination among all youths age 12-17 years and by parents' and youths' ratings of present health status: United States, 1966-1970

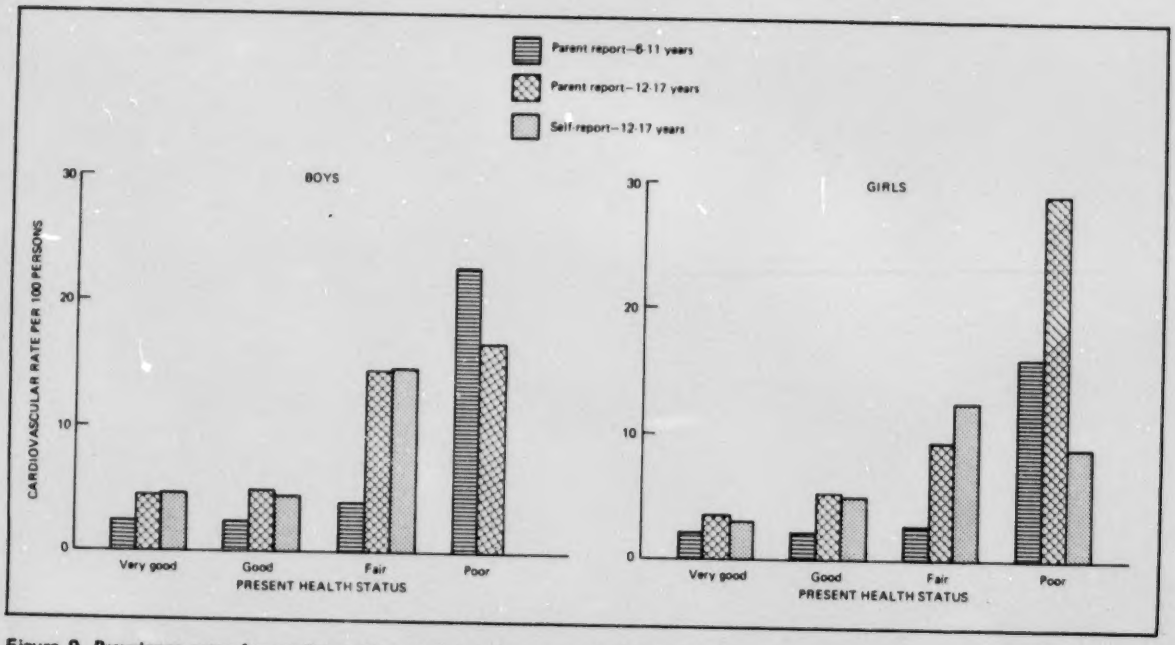

Figure 9. Prevalence rates for cardiovascular conditions from examination among boys and girls age 6-17 years by parents' ratings of present health status and among youths age 12-17 years by self-rating of present health status: United States, 1963-1970

health were twice as high and for those in poor health 4 times as high as those reported by their parents to be in good, very good, or excellent health, though about 4 percent or more in each health status group had a cardiac condition identified on examination. (The respective proportions of all youths in these health status groups were 0.3 percent poor, 3.3 percent fair, 29.5 percent good, 33.9 percent very good, and 33.0 percent excellent.)[6]

When youths rated their own health, those in fair health were about 3 times more likely to have a cardiovascular condition than those rating themselves in poor, good, very good, or excellent health. (The respective proportions of all youths in these health status groups were 0.4 percent poor, 4.2 percent fair, 36.4 percent good, 32.8 percent very good, and 26.2 percent excellent.)

Children and youths whose parents were worried about their offsprings' health were more likely than those whose parents were not worried to have a cardiovascular condition. Similarly children and youths taking medication regularly were more likely to have a cardiovascular condition than were those who did not take medicine regularly.

Demographic-Socioeconomic Trends

Race.—From the history, white boys age 6-17 years and white girls age 6-11 years were slightly more likely than were Negro boys and girls of corresponding ages to have been reported by their parents as having a history of a heart condition. Among girls age 12-17 years, however, the reverse is evident, though none of the differences are large enough to be statistically significant (table 10). Heart condition as the most serious illness was more likely to have been reported among Negro girls than among white girls and among white boys than among Negro boys.

The prevalence of significant cardiovascular conditions (diagnostic impression) is higher among Negro children than among white children (4.2 per 100 compared with 2.1 per 100) and among Negro youths than among white youths (5.7 per 100 compared with 4.5 per 100); the difference is large enough to be

statistically significant only among the children (table 12). The racial pattern is consistent across the 6-17-year age range except at 10, 15, and 17 years, and among girls but not among boys in both age groups.

From the examination findings, murmurs are more prevalent among white youths (17.5 per 100) than among Negro youths (13.0 per 100); among children the rates for the two races are similar (26.7 per 100 for white children and 26.0 per 100 for Negro children) (table 10). However, the other diagnostic findings—from EKG, chest X-ray, and cardiac history as determined at examination—show abnormal rates that range from 53 percent higher for Negro children than for white children on cardiac history to nearly 150 percent higher on chest X-ray findings (table 11).

Region.—Cardiovascular conditions are more prevalent among children and youths living in the South than among those living in the Northeast, Midwest, or West, the four broad geographic regions into which the United States was divided in the sampling frame used in these two studies. The cardiovascular condition rates among youths in the South are significantly higher than those for youths living elsewhere in the United States. In each of the four geographic regions, the cardiovascular condition rates among Negro children exceed those for white children (table 13). However, among youths this pattern is consistent only in the Midwest and South. Among both white and Negro youths the prevalence rates for cardiovascular conditions are highest in the South.

Place of Residence.—Cardiovascular conditions are more prevalent among children and youths in rural than in urban areas. The differences in the rates are greater among children (2.0 per 100 in urban areas, 3.2 per 100 in rural) than among youths (4.3 per 100 in urban areas compared with 5.1 per 100 in rural) and large enough to be statistically significant only among children.

The rural rates are consistently higher among both the white and Negro child and youth populations.

Income.—The prevalence of cardiovascular conditions shows a consistent inverse association with family income. Among both children and youths, the cardiovascular condition rates are highest among those with annual family incomes of less than $5,000 and decrease with increase in family income. The pattern is consistent among girls but not boys in both age groups.

The association between cardiovascular condition rates and family income is more consistent among the white than the Negro groups.

Parent education.—Similar to the findings with respect to family income there is a strong inverse association between the prevalence rates of cardiovascular conditions and educational level of the head of the household. The prevalence rates for cardiovascular conditions of children and youths are highest among those in which the head of the household had the least education (less than 5 years' formal schooling) then generally decrease as educational level increases. For children 6-11 years the rates drop nearly 60 percent, from 4.2 per 100 among those whose parent had completed less than 5 years' formal schooling to 1.7 per 100 among those whose parent had some college education; among youths, the decrease is slightly slower, from 6.9 per 100 in the lowest educational level group to 3.7 per 100 among those where the household head had some college education.

COMPARISON WITH OTHER STUDIES

Estimates of the prevalence of cardiovascular conditions among children and youths have been obtained through household interview and/or examination in various community and national studies designed primarily to determine the impact of chronic illness on the population and the need for care or treatment. Methods and criteria used, and, hence, the resultant estimates obtained, have differed substantially; most rates have been lower than those derived from the present national examination surveys because different methods and definitions were used.

National estimates based on findings from the national probability sample of households included in the Health Interview Surveys of 1959-1961[13] and 1972[14] show cardiovascular condition rates among children under 17 years of age of 8.3 per 1,000 in the 1959-1961 study and 17.4 per 1,000 in the 1972 study. Rather than any real increase in prevalence, the apparent increase in these rates may reflect in-

creases in availability or utilization of medical care as well as improvement in interviewing methods. The estimated cardiovascular condition prevalence rates among the child population 5-16 years of age from the Health Interview Survey would be approximately 10 per 1,000 in 1959-1961 and 21 per 1,000 in 1972 compared with the rate of 35 per 1,000 among those 6-17 years of age from the two Health Examination Surveys in 1963-1970. Since the Health Interview Survey information is of necessity limited to known conditions, the prevalence rates derived from it would be expected to be lower than those from the Health Examination Survey, where both known and unknown conditions would be identified.

Among the community or more geographically limited studies in the United States which included an examination and from which prevalence estimates for cardiovascular conditions in the child population have been published are the study of handicapped children in Georgia,[15] the study from the medical records of the enrollees in the Health Insurance Plan (HIP) of Greater New York,[16] the Chicago Area High School Study in which tape recorded heart sounds were used,[17] and the evaluation of heart disease screening methods among Denver parochial school children.[18]

Wishik reports a prevalence rate for heart conditions of 10 per 1,000 among the child population under 21 years of age in two counties of Georgia.[15] In this community study, the initial identification of children with handicapping conditions was obtained through voluntary reporting by professional workers and citizens. A 10-percent sample of those so identified was later examined. Hence, this estimate will probably be limited to those with known cardiovascular conditions.

In the HIP study, Densen et al.[16] show prevalence rates of 38.5 per 1,000 enrollees among those 5-14 years of age (and 38.6 per 1,000 enrollees among those 15-24 years of age) receiving one or more services related to a cardiovascular condition per year during the 1948-1951 period. As expected, these rates are slightly higher than those for the U.S. child and youth populations from the present study since they would probably include a substantially greater number in need of medical care than would be found in a probability sample of the population.

In their study, Smith et al.[17] obtained tape recordings of heart sounds among a stratified random sample of nearly 50,000 Chicago area high school students. Those with abnormal heart sounds were recalled for a complete examination and workup. The prevalence rates of suspected organic heart disease among these Chicago students were 17.7 per 1,000. After the more detailed examination, the cardiovascular prevalence rates among high school students in the Chicago area were determined to be 1.4 per 1,000 with congenital heart disease, 0.7 per 1,000 with rheumatic heart disease, and 2.1 per 1,000 with heart disease of all types combined. Here again the prevalence rates from the Chicago area would be expected to be lower than those in the present national study because only a single criterion was used for screening (the heart sounds) and the followup examination was more extensive than that in the present national study.

In the Denver study,[18] more than 17,000 parochial school children were screened, using four different methods. Those with suspected heart disease were then reexamined by cardiologists at special clinics. From this study, the rheumatic heart disease prevalence rate was found to be 1.7 per 1,000 children. A history of rheumatic fever was reported by 12.4 percent of the schoolchildren and by 44.8 percent of those determined to have rheumatic heart disease. Here again, the prevalence rate of rheumatic heart disease of 1.7 per 1,000 is less than half that determined from the present national study (4 per 1,000, using the limited criteria of known rheumatic heart disease, rheumatic fever history with some present evidence of heart pathology, or evidence of mitral valve impairment) because of the more extensive examination given in the Denver study. The prevalence of known history of rheumatic fever among the Denver parochial school children (12.4 percent) was, however, substantially higher than that reported on medical history for U.S. children (0.5 percent) and youths (0.9 percent).

From a British longitudinal study in 1946-1961, Pless and Douglas[19] report a cardiovascu-

lar prevalence rate of 2.5 per 1,000 among children under 16 years. In this study, a sample of children born in England, Wales, and Scotland during one week in March (1946) were followed through 15 years. Information on chronic conditions was obtained through interview and examinations by school doctors. Description of the examination methods and criteria used is not detailed enough to permit comparison with the present U.S. survey findings.

SUMMARY

This report contains national estimates of the prevalence of cardiovascular conditions among noninstitutionalized children and youths 6-17 years by age, race, sex, geographic region, urban or rural residence, annual family income, and education of parent. Included also is information on the extent to which the various cardiovascular findings from the examination and medical history were present among those with diagnostic impression of heart and other circulatory conditions.

These estimates are based on findings from the Health Examination Surveys of 1963-1965 and 1966-1970. For these two surveys, samples of 7,417 children 6-11 years and 7,514 youths 12-17 years were selected to represent the 23.8 million children and 22.7 million youths of these ages in the U.S. noninstitutionalized population at the respective midsurvey points. Of these, 7,119, or 96 percent, of the children and 6,768, or 90 percent, of the youths were examined. The examined groups were closely representative of the target populations from which the samples were drawn with respect to age, race, sex, geographic region, population size of place of residence, and rate of change in population size of residence from 1950 to 1960.

From the examination diagnostic impressions, an estimated 2.4 per 100, or nearly 0.6 million children 6-11 years of age, and 4.6 per 100, or more than 1 million youths 12-17 years of age in the U.S. noninstitutionalized population, have a significant cardiovascular condition. Among children, 71 percent of these conditions were considered congenital compared with 9 percent among youths.

Prevalence rates for cardiovascular conditions are consistently lower among children (ranging from 2.0 per 100 at age 9 years to 2.8 per 100 at ages 7 and 8 years) than among youths, for whom these rates range from 3.6 per 100 at age 12 years to 5.6 per 100 at ages 14 and 16 years.

From the medical histories, the prevalence of ever having had a murmur or anything else wrong with the heart is only slightly higher among youths (4.9 per 100) than among children (4.1 per 100).

Boys were slightly more likely than were girls to have or have had a heart condition as determined either from the examination or history.

Nearly 80 percent of children with diagnostic impression of a cardiovascular condition had a significant or possibly significant heart murmur compared with only 45 percent among youths with cardiovascular conditions.

The history of known cardiac conditions as obtained from the medical history and from the children by the pediatrician during the physical examination is about 50 percent greater than that shown from the medical history as given by the parents alone.

Among youths, the four principal types of cardiovascular conditions identified on examination were significant murmurs (2.1 per 100 youths), hypertension (0.6 per 100 youths), atrial or ventricular septal defects (0.5 per 100 youths), and symptomatic heart disease such as arrhythmias and (incomplete) heart block (0.4 per 100 youths). From this, the estimated prevalence of hypertensive heart disease was 0.6 per 100 and that for rheumatic heart disease was 1.0 per 100 (or 0.4 per 100 if only mitral valve defects were considered without known rheumatic fever history). Recording on the children's examination was not given in sufficient detail to make comparable determinations for them.

From the children's examination but not that among youths, determinations could be made of the extent to which the various cardiovascular findings were present among those with a final diagnostic impression of abnormal cardiac condition. The strongest association, as expected, was with the findings of murmurs.

Among children and youths, mean systolic blood pressures of those with significant cardiovascular conditions are higher than the means for those with essentially normal cardiovascular findings; the difference is greater among youths than among children. Only among youths was the mean diastolic blood pressure significantly higher among those with a cardiac condition than among those without a cardiac condition.

The prevalence of cardiovascular conditions is higher among Negro children and youths than among the white groups, among those living in the South, among those living in rural areas, and among those in families with annual incomes less than $5,000 or whose parent had less than 5 years' formal schooling.

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Age and sex	Cardiovascular condition (diagnostic impression)			Medical history (from parent)		Exercise now restricted			
						History from parent		History from youth	
	All types	Congenital	Acquired or unknown	Heart condition[1]	Rheumatic fever[2]	Heart condition	No heart condition	Heart condition	No heart condition
	Rate per 100 persons								
Both sexes									
6 years	2.5	1.9	0.6	4.0	0.2	3.6	0.8	...	...
7 years	2.8	1.6	1.2	3.7	0.2	-	1.2	...	...
8 years	2.8	1.8	1.0	4.5	0.5	-	1.5	...	...
9 years	2.0	1.6	0.4	3.4	0.5	-	1.2	...	...
10 years	2.1	1.6	0.5	4.6	1.1	5.5	1.7	...	...
11 years	2.3	1.4	0.9	4.6	0.8	2.0	1.8	...	...
12 years	3.6	0.2	3.4	4.7	0.7	6.2	2.7	3.0	1.0
13 years	4.1	0.3	3.8	4.3	1.0	13.1	3.6	4.7	2.2
14 years	5.6	0.7	4.9	5.2	0.6	13.8	3.8	12.5	2.3
15 years	4.3	0.3	4.0	5.1	0.5	17.8	4.8	13.1	4.2
16 years	5.6	0.3	5.3	4.5	1.2	7.8	4.1	-	2.6
17 years	4.6	0.5	4.1	5.9	1.6	20.2	6.3	9.5	4.6
6-11 years	2.4	1.7	0.7	4.1	0.6	1.8	1.4	...	...
12-17 years	4.6	0.4	4.2	4.9	0.9	13.4	4.2	7.4	2.8
Boys									
6-11 years	2.5	1.8	0.7	4.7	0.5	1.6	1.3	...	...
12-17 years	4.9	0.4	4.5	5.3	1.0	11.7	4.2	6.2	2.5
Girls									
6-11 years	2.3	1.5	0.8	3.5	0.6	2.2	1.4	...	...
12-17 years	4.4	0.4	4.0	4.5	0.9	15.4	4.1	8.9	3.1
	Standard error								
Both sexes									
6-11 years	0.26	0.20	0.09	0.29	0.11	0.24	0.09	...	...
12-17 years	0.71	0.09	---	0.36	0.09	1.78	0.26	1.04	0.23
Boys									
6-11 years	0.43	0.28	0.13	0.35	0.12	0.31	0.10	...	...
12-17 years	0.87	0.16	---	0.44	0.12	2.28	0.33	2.41	0.30
Girls									
6-11 years	0.25	0.18	0.12	0.48	0.18	0.52	0.09	...	...
12-17 years	0.68	0.09	---	0.51	0.12	3.63	0.26	2.43	0.36

[1] Includes history of murmurs.
[2] For children, history of rheumatic fever; for youths, rheumatic fever only if most serious illness.

Table 2. Proportion of youths with rheumatic fever reported as their most serious illness on medical history, by age rheumatic fever started, severity of illness, age at examination, and sex, with standard errors for totals: United States, 1966-1970

Age and sex	Rheumatic fever	Age rheumatic fever started		Seriousness of rheumatic fever					Lasting effects from rheumatic fever
		Under 6 years	6-11 years	Mild case	Moderate case	Severe case	Unknown	No doctor seen	
	Rate per 100 youths	Percent of those with rheumatic fever history		Rate per 100 youths					
Both sexes, 12-17 years	0.9	28.4	71.5	0.4	0.3	0.1	0.0	0.1	0.5
12 years	0.7	-	100.0	0.5	0.1	0.1	-	-	0.7
13 years	1.0	41.8	58.1	0.5	0.4	0.1	-	-	0.7
14 years	0.6	25.8	74.2	0.4	0.2	-	-	-	0.3
15 years	0.5	30.8	69.2	0.2	0.1	0.2	-	-	0.2
16 years	1.2	31.8	68.2	0.4	0.5	0.2	0.1	-	0.3
17 years	1.6	30.6	69.4	0.4	0.7	0.2	0.2	0.1	0.8
Boys, 12-17 years	1.0	30.1	69.8	0.5	0.3	0.1	0.0	0.1	0.6
Girls, 12-17 years	0.9	26.6	73.4	0.2	0.4	0.2	0.1	-	0.5
	Standard error								
Both sexes, 12-17 years	0.09	5.36	5.36	---	---	---	---	---	0.10
Boys, 12-17 years	0.12	7.95	7.95	---	---	---	---	---	0.14
Girls, 12-17 years	0.12	9.41	9.41	---	---	---	---	---	0.15

Table 3. Prevalence rates for examination findings of significant murmurs among children in 1963-1965 and youths in 1966-1970 for major types of cardiovascular conditions from diagnostic impression among youths, and for additional cardiovascular findings on examination among children, by age and sex, with standard errors for totals: United States

Age and sex	Murmurs significant or possibly significant	Cardiovascular condition (diagnostic impression)			Additional cardiovascular findings on examination		
		Hypertensive heart disease	Rheumatic heart disease	Other heart disease	Positive EKG	Positive chest X-ray	Abnormal cardiac history on examination
	Rate per 100 persons						
Both sexes							
6 years	3.7	---	---	---	4.3	2.8	6.1
7 years	3.5	---	---	---	5.4	3.0	5.4
8 years	3.9	---	---	---	4.8	2.0	6.1
9 years	2.8	---	---	---	5.1	3.1	6.9
10 years	2.8	---	---	---	4.0	3.1	6.4
11 years	4.5	---	---	---	4.8	4.5	6.2
12 years	1.7	0.1	0.8	2.5	---	---	---
13 years	2.0	0.5	1.0	2.3	---	---	---
14 years	2.7	0.6	1.0	3.3	---	---	---
15 years	2.2	0.4	0.8	2.8	---	---	---
16 years	2.9	1.3	1.4	2.6	---	---	---
17 years	3.1	0.9	1.1	2.1	---	---	---
6-11 years	3.5	---	---	---	4.7	3.1	6.2
12-17 years	2.4	0.6	1.0	2.6	---	---	---
Boys							
6-11 years	3.5	---	---	---	5.5	3.4	6.8
12-17 years	2.5	0.6	1.1	2.8	---	---	---
Girls							
6-11 years	3.6	---	---	---	4.0	2.8	5.6
12-17 years	2.3	0.6	1.0	2.4	---	---	---
	Standard error						
Both sexes							
6-11 years	0.38	---	---	---	1.21	0.66	1.43
12-17 years	0.30	0.15	0.16	0.58	---	---	---
Boys							
6-11 years	0.65	---	---	---	1.49	0.73	1.57
12-17 years	0.40	0.19	0.20	0.69	---	---	---
Girls							
6-11 years	0.37	---	---	---	0.99	0.65	1.44
12-17 years	0.32	0.19	0.18	0.54	---	---	---

Table 4. Prevalence rates for cardiovascular conditions from diagnostic impression and percent distribution of youths age 12-17 years, by type of condition: United States, 1966-1970

Type of cardiovascular condition and ICDA code	Diagnostic impression		
	Significant cardiovascular findings	Other significant findings	Essentially normal
	Rate per 100 youths		
All youths, 12-17 years	4.6	17.2	78.2
	Percent distribution of youths		
All youths, 12-17 years	100.0	100.0	100.0
No specified type of cardiovascular findings	1.3	98.5	99.4
Cardiovascular findings specified	98.7	1.5	0.6
All youths with cardiovascular conditions	[1]100.0	100.0	100.0
Rheumatic fever with heart involvement (391)	4.5	-	-
Mitral valve insufficiency or stenosis (394.9)	3.1	-	-
Aortic valve disease or stenosis (395.9)	4.4	-	-
Atrial or ventricular septal defect (397)	10.1	-	3.5
Hypertension (401)	13.4	30.7	47.4
Significant murmurs (401, 424.9)	45.1	69.3	42.8
Symptomatic heart disease (arrhythmias, heartblock) (427.3, 427.9)	8.5	-	3.1
Ill-defined heart disease (cardiomegaly, ventricular hypertrophy, chest pains) (429.0, 429.9)	2.6	-	-
Diseases of arteries or veins (dilated arteries, varicose veins) (441.9, 454.9)	0.5	-	-
Congenital heart disease or anomalies (746.0, 746.2, 746.3)	3.9	-	-
Congenital anomalies of circulation (747.0, 747.3)	4.8	-	3.2
Other heart condition—type not specified	1.3	-	-

[1] Adds to more than 100 percent because some youths had more than one type of condition.

Table 5. Percent of children in 1963-1965 and youths in 1966-1970, by examination findings of lateral and vertical position of the point of maximum impulse of the heart, severity of murmurs identified, age, and sex, with standard errors for totals: United States

Age and sex	Point of maximum impulse							Murmurs present			
	Not felt	Interspace			Midclavicular line			Any present	Significant	Possibly significant	Innocent
		4	5	6	At	Inside	Outside				
	Percent of persons										
Both sexes											
6 years	---	43.8	55.7	0.5	47.1	51.9	1.0	29.5	0.8	2.9	25.8
7 years	---	41.9	57.5	0.6	49.3	49.9	0.8	26.6	0.9	2.6	23.1
8 years	---	39.5	59.8	0.8	52.8	46.1	1.1	27.2	0.7	3.2	23.3
9 years	---	34.5	64.8	0.7	50.8	47.6	1.5	24.3	0.9	1.9	21.5
10 years	---	33.6	65.1	1.3	52.0	46.8	1.2	25.6	0.7	2.1	22.8
11 years	---	28.3	69.9	1.8	53.8	45.2	1.1	26.3	0.4	4.1	21.8
12 years	3.0	36.7	56.0	4.3	34.3	60.0	2.7	18.0	0.4	1.3	16.3
13 years	4.4	30.6	58.5	6.5	33.7	59.3	2.6	18.4	0.2	1.8	16.4
14 years	4.7	26.2	60.2	8.9	33.0	58.3	4.0	16.7	0.6	2.1	14.0
15 years	5.9	26.2	56.8	11.1	33.3	57.2	3.6	16.0	0.3	1.9	13.8
16 years	9.7	24.1	56.6	9.6	31.6	55.0	3.7	15.3	1.2	1.7	12.4
17 years	8.2	20.2	61.8	9.9	32.2	55.5	4.1	16.5	0.5	2.6	13.4
6-11 years	---	37.1	62.0	0.9	50.9	48.0	1.1	26.6	0.7	2.8	23.1
12-17 years	5.9	27.6	58.2	8.3	33.1	57.6	3.4	16.9	0.5	1.9	14.5
Boys											
6-11 years	---	36.4	62.5	1.1	51.0	47.8	1.2	26.4	0.8	2.7	22.9
12-17 years	4.0	26.9	61.1	8.0	37.7	55.0	3.3	17.0	0.6	1.9	14.5
Girls											
6-11 years	---	37.8	61.4	0.8	50.9	48.1	1.0	26.9	0.7	2.9	23.3
12-17 years	7.8	28.3	55.4	8.5	28.3	60.4	3.5	16.7	0.5	1.8	14.4
	Standard error										
Both sexes											
6-11 years	---	6.46	6.37	0.34	5.23	5.31	0.28	2.06	---	---	---
12-17 years	0.80	3.82	3.37	2.54	3.74	4.13	0.97	1.26	---	---	---
Boys											
6-11 years	---	6.56	6.45	0.41	5.02	5.11	0.30	2.16	---	---	---
12-17 years	0.55	4.01	3.42	2.31	4.13	4.40	0.95	1.31	---	---	---
Girls											
6-11 years	---	6.41	6.34	0.29	5.53	5.60	0.29	2.18	---	---	---
12-17 years	1.21	3.80	3.50	2.99	3.66	4.26	1.00	1.53	---	---	---

NOTE: 0.4 percent not felt among children, excluded from total.

Table 6. Percent distribution of children in 1963-1965 and youths in 1966-1970 by examination findings of lateral by vertical position of maximum impulse of the heart, according to age and sex, with standard errors for totals: United States

Age and sex	Point of maximum impulse—at interspace								
	4			5			6		
	At mid-clavicular line	Inside	Outside	At mid-clavicular line	Inside	Outside	At mid-clavicular line	Inside	Outside
Both sexes	Percent distribution of persons at each interspace								
6 years	55.2	47.6	0.2	43.0	55.4	1.6	62.6	23.5	13.9
7 years	55.8	43.9	0.3	45.0	54.0	1.0	21.6	63.9	14.5
8 years	57.7	41.7	0.6	50.0	48.6	1.4	18.9	81.1	-
9 years	55.2	44.3	0.5	48.8	49.1	2.1	27.1	72.9	-
10 years	54.6	44.6	0.8	50.5	48.1	1.4	61.4	38.6	-
11 years	62.2	37.4	0.4	50.8	47.8	1.4	36.1	63.9	-
12 years	29.1	70.4	0.5	40.6	55.0	4.4	19.8	78.0	2.2
13 years	28.6	71.1	0.2	40.3	55.9	3.8	22.1	74.4	3.5
14 years	24.0	75.0	1.0	39.1	54.8	6.1	35.6	63.4	1.0
15 years	30.9	68.5	0.6	39.7	54.9	5.4	24.2	72.7	3.1
16 years	29.7	69.7	0.6	37.4	56.8	5.8	35.1	62.8	2.1
17 years	24.4	75.6	-	41.1	52.5	6.4	19.3	79.4	1.3
6-11 years	55.6	43.6	0.4	48.2	50.4	1.5	39.3	57.8	2.9
12-17 years	28.0	71.5	0.5	39.7	55.0	5.3	26.7	71.1	2.2
Boys									
6-11 years	56.0	43.6	0.4	48.3	50.0	1.7	38.5	59.2	2.2
12-17 years	32.8	66.6	0.6	43.1	51.9	5.0	31.9	66.5	1.6
Girls									
6-11 years	55.8	43.7	0.6	48.0	50.8	1.2	40.4	55.8	3.7
12-17 years	23.3	76.2	0.5	35.9	58.4	5.7	21.7	75.6	2.7
Both sexes	Standard error								
6-11 years	7.20	7.21	0.17	6.28	6.40	0.44	13.75	14.42	3.56
12-17 years	7.71	7.73	0.19	3.85	4.00	1.43	5.08	5.20	1.48
Boys									
6-11 years	6.95	6.94	0.24	6.23	6.36	0.49	16.17	16.16	2.54
12-17 years	8.72	8.74	0.21	4.14	4.20	1.44	4.84	4.95	0.70
Girls									
6-11 years	7.65	7.69	0.23	6.42	6.53	0.44	13.86	17.73	7.20
12-17 years	7.21	7.24	0.22	3.97	4.21	1.46	6.52	6.98	2.88

Table 7. Prevalence rates for cardiovascular conditions among children in 1963-1965 and youths in 1966-1970 with specific types of findings from examination and medical history, by age and sex, with standard errors for totals: United States

Age and sex	Point of maximum impulse						Murmurs significant or possibly significant	Positive EKG	Positive chest X-ray	1st heart sound abnormal	2nd heart sound abnormal	Other heart abnormality	Heart condition history (from parent)[1]	Positive cardiac history at examination
	Interspace			Midclavicular line										
	4	5	6	At	Inside	Outside								
Both sexes	Prevalence of heart condition, rate per 100 persons													
6 years	1.8	2.8	30.0	4.1	0.5	33.0	58.5	19.5	30.0	---	---	---	10.2	37.3
7 years	2.1	3.2	16.1	3.7	2.1	-	68.0	31.2	82.8	---	---	---	18.7	50.8
8 years	1.6	3.6	9.7	2.8	2.2	25.5	50.5	25.2	38.2	---	---	---	14.5	48.3
9 years	1.2	2.5	-	1.9	0.7	46.3	64.8	17.1	65.6	---	---	---	15.5	51.4
10 years	3.1	1.6	5.7	2.4	1.4	23.0	65.1	19.3	27.9	---	---	---	25.7	52.3
11 years	1.5	2.4	5.8	3.1	1.2	6.7	41.8	21.9	43.4	---	---	---	21.2	38.4
12 years	3.5	4.1	-	4.2	3.4	2.9	97.0	---	---	-	26.1	35.9	15.1	---
13 years	3.2	3.8	8.0	3.9	3.8	8.4	88.7	---	---	18.0	38.1	34.0	18.9	---
14 years	3.2	6.3	6.3	7.5	4.3	6.1	98.0	---	---	30.9	39.8	74.6	24.2	---
15 years	5.0	4.1	4.3	4.6	3.7	12.3	94.6	---	---	59.5	28.1	42.4	18.9	---
16 years	2.4	6.0	4.8	5.4	4.0	13.4	94.7	---	---	19.5	49.5	13.9	21.2	---
17 years	3.9	5.5	3.7	5.8	4.1	10.5	77.2	---	---	54.8	48.1	28.9	20.3	---
6-11 years	1.9	2.7	8.8	3.0	1.4	25.7	56.8	22.6	50.4	---	---	---	17.8	46.3
12-17 years	3.5	5.0	4.8	5.2	3.9	9.1	90.3	---	---	34.6	37.9	42.1	19.6	---
Boys														
6-11 years	1.9	2.7	12.7	3.2	1.4	21.1	60.0	21.4	44.7	---	---	---	16.5	40.3
12-17 years	3.5	5.3	5.0	5.8	3.9	7.0	90.0	---	---	39.5	39.2	41.7	21.0	---
Girls														
6-11 years	1.9	2.6	3.3	2.8	1.3	32.1	53.8	24.4	58.2	---	---	---	19.6	55.2
12-17 years	3.6	4.6	4.5	4.3	3.8	11.2	91.0	---	---	24.6	36.4	42.5	18.1	---
Both sexes	Standard error													
6-11 years	0.46	0.37	4.99	0.44	0.33	7.26	---	3.95	9.86	---	---	---	3.07	8.95
12-17 years	1.40	0.96	0.79	0.97	0.82	2.39	---	---	---	10.55	15.93	8.12	4.27	---
Boys														
6-11 years	0.60	0.49	5.86	0.57	0.48	7.89	---	4.42	14.89	---	---	---	3.37	10.00
12-17 years	2.75	1.25	0.99	1.21	0.93	2.51	---	---	---	11.32	22.51	8.24	5.02	---
Girls														
6-11 years	0.57	0.45	5.86	0.44	0.42	11.58	---	6.40	9.15	---	---	---	3.91	9.27
12-17 years	1.26	1.03	0.74	0.87	0.78	3.59	---	---	---	19.95	12.91	12.99	3.87	---

[1] Includes murmurs.

Table 8. Mean systolic and diastolic blood pressure (2-reading average) among children in 1963-1965 and youths in 1966-1970 with normal and abnormal cardiovascular diagnostic impressions from examination, by age and sex, with standard errors for totals: United States

Age and sex	Cardiovascular diagnostic impression									
	Normal	Abnormal				Normal	Abnormal			
		All types	Hypertensive heart disease	Non-hypertensive heart disease	Significant murmurs		All types	Hypertensive heart disease	Non-hypertensive heart disease	Significant murmurs
Both sexes	Mean systolic blood pressure (mm. Hg)					Mean diastolic blood pressure (mm. Hg)				
6 years	105.9	105.7	---	---	---	65.5	66.8	---	---	---
7 years	107.9	110.1	---	---	---	65.9	67.7	---	---	---
8 years	109.4	112.8	---	---	---	66.8	67.9	---	---	---
9 years	110.8	112.9	---	---	---	67.2	67.7	---	---	---
10 years	111.9	114.9	---	---	---	67.7	65.6	---	---	---
11 years	113.7	116.5	---	---	---	66.8	66.7	---	---	---
12 years	122.6	124.3	158.5	124.0	124.2	69.5	68.8	79.3	68.8	68.8
13 years	126.4	135.0	148.0	133.3	135.0	71.4	73.6	87.1	70.6	71.6
14 years	129.2	137.3	148.1	135.4	134.7	72.9	75.1	92.2	72.8	71.5
15 years	130.9	137.5	149.6	135.5	137.6	74.1	76.2	87.9	73.6	72.4
16 years	132.7	144.1	155.8	139.2	143.9	75.4	79.8	92.2	75.7	73.9
17 years	133.5	146.9	156.5	142.1	144.5	76.6	79.6	89.5	76.7	75.8
6-11 years	109.9	112.2	---	---	---	66.6	67.1	---	---	---
12-17 years	129.0	138.0	152.9	134.8	136.2	73.2	75.7	89.7	73.0	72.2
Boys										
6-11 years	109.3	111.0	---	---	---	66.4	66.3	---	---	---
12-17 years	130.8	139.7	153.4	136.8	138.3	73.0	75.0	89.6	72.5	72.0
Girls										
6-11 years	110.4	113.5	---	---	---	66.8	67.9	---	---	---
12-17 years	127.3	136.0	152.4	132.5	133.6	73.3	76.6	89.9	73.6	72.4
Both sexes	Standard error									
6-11 years	0.33	0.92	---	---	---	0.60	0.83	---	---	---
12-17 years	0.42	1.11	3.77	1.12	1.07	0.30	0.79	2.75	0.59	0.88
Boys										
6-11 years	0.35	1.03	---	---	---	0.60	0.84	---	---	---
12-17 years	0.41	1.29	3.39	1.26	1.22	0.36	0.96	3.61	0.53	0.53
Girls										
6-11 years	0.34	1.12	---	---	---	0.62	1.05	---	---	---
12-17 years	0.48	1.37	4.83	1.19	1.16	0.29	1.33	2.60	1.24	1.85

Table 9. Prevalence rates for cardiovascular conditions from diagnostic impression among children age 6-11 years in 1963-1965 and youths age 12-17 years in 1966-1970, by present health status, health a worry (to parent), regular use of medicine, and sex, with standard errors: United States

Health status and use of medicine	Children, 6-11 years			Youths, 12-17 years			Children, 6-11 years			Youths, 12-17 years		
	Both sexes	Boys	Girls	Both sexes	Boys	Girls	Both sexes	Boys	Girls	Both sexes	Boys	Girls
	Cardiovascular rate per 100 persons						Standard error					
Present health status (parent rating)												
Excellent	...	...	...	4.0	4.9	3.1	...	...	...	0.77	1.13	0.49
Very good	2.2	2.3	2.2	3.8	3.9	3.7	0.38	0.60	0.32	0.85	0.98	0.84
Good	2.4	2.4	2.4	5.3	5.0	5.5	0.31	0.42	0.38	0.88	1.18	0.99
Fair	3.4	4.0	2.9	11.9	14.4	9.5	0.92	1.43	1.25	2.55	4.53	2.67
Poor	19.7	22.7	16.2	23.8	16.7	29.1	9.12	9.45	12.82	17.18	12.33	25.30
Present health status (youth rating)												
Excellent	...	...	...	3.5	3.9	3.1	...	...	...	0.85	1.20	0.72
Very good	...	...	...	4.2	5.3	3.1	...	...	...	0.66	0.92	0.59
Good	...	...	...	4.8	4.5	5.1	...	...	...	0.93	1.05	1.01
Fair	...	...	...	13.5	14.6	12.7	...	...	...	3.19	5.09	3.55
Poor	...	...	...	4.0	-	8.9	...	...	...	3.92	-	9.49
Health												
A worry	3.4	3.4	3.4	7.1	6.9	7.4	0.62	0.63	1.06	0.95	1.26	1.35
Not a worry	2.2	2.4	2.1	4.2	4.6	3.9	0.32	0.48	0.30	0.72	0.90	0.66
Medicine used regularly (parent report)												
Yes	5.5	4.4	6.7	6.6	6.1	7.2	1.39	1.39	2.14	1.10	1.87	2.09
No	2.3	2.4	2.2	4.5	4.8	4.2	0.28	0.45	0.26	0.73	0.89	0.68
Medicine used regularly (youth report)												
Yes	...	...	...	7.1	5.9	8.1	...	...	...	1.00	1.69	1.81
No	...	...	...	4.4	4.8	4.0	...	...	...	0.70	0.88	0.68

Table 10. Prevalence rates among white and Negro children in 1963-1965 and youths in 1966-1970 for selected examination and history findings relating to cardiovascular conditions, by age and sex, with standard errors for totals: United States

Age and sex	Medical history—heart condition (from parent)		Rheumatic fever history (from parent)[1]		Heart condition—most serious illness (from parent)		Significant murmurs found on examination		Diagnostic impression—congenital heart condition	
	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro
Both sexes	Rate per 100 persons									
6 years	3.7	1.4	0.3	-	---	---	31.4	19.0	1.7	3.6
7 years	3.8	1.0	0.2	-	---	---	25.9	30.5	1.5	1.9
8 years	3.6	5.8	0.4	1.0	---	---	27.9	23.9	1.3	4.5
9 years	3.7	-	0.5	0.4	---	---	23.6	27.8	1.3	3.6
10 years	3.8	3.8	1.2	-	---	---	25.8	23.6	1.8	0.6
11 years	4.4	2.8	0.8	0.9	---	---	25.5	31.6	1.2	2.7
12 years	4.4	6.3	0.7	1.1	0.2	2.0	18.6	15.4	0.1	1.2
13 years	3.9	6.1	1.1	-	0.2	1.0	19.6	11.1	0.3	-
14 years	5.6	2.2	0.6	0.5	0.9	1.0	17.5	11.3	0.8	-
15 years	5.3	3.6	0.5	-	0.5	-	17.1	9.1	0.3	0.5
16 years	4.8	2.7	1.4	-	0.5	0.6	15.0	17.5	0.4	-
17 years	6.2	3.0	1.7	0.7	0.4	-	17.0	13.5	0.6	-
6-11 years	3.8	2.5	0.6	0.4	---	---	26.7	26.0	1.5	2.8
12-17 years	5.0	4.1	1.0	0.4	0.5	0.8	17.5	13.0	0.4	0.3
Boys										
6-11 years	4.5	2.1	0.6	0.1	---	---	26.6	25.0	1.8	2.3
12-17 years	5.6	2.6	1.0	0.3	0.6	0.3	17.7	11.9	0.5	-
Girls										
6-11 years	3.2	2.9	0.6	0.6	---	---	26.9	26.9	1.2	3.3
12-17 years	4.4	5.5	0.9	0.5	0.3	1.3	17.2	14.1	0.4	0.6
Both sexes	Standard error									
6-11 years	0.26	0.69	0.13	0.23	---	---	2.25	2.02	0.18	0.81
12-17 years	0.39	0.77	0.12	0.24	0.12	0.31	1.41	1.15	0.11	0.15
Boys										
6-11 years	0.33	0.76	0.15	0.13	---	---	2.35	1.81	0.23	1.47
12-17 years	0.45	0.65	0.13	0.23	0.16	0.20	1.47	1.05	0.19	-
Girls										
6-11 years	0.47	0.76	0.21	0.43	---	---	2.42	3.11	0.20	0.71
12-17 years	0.55	1.12	0.17	0.32	0.14	0.55	1.72	1.72	0.09	0.31

[1] Data for youths are limited to most serious illness.

Table 11. Prevalence rates for specific abnormal cardiac findings on examination of white and Negro children, by age and sex, with standard errors for totals: United States, 1963-1965

Age and sex	EKG findings		Chest X-ray findings		Abnormal cardiac history at examination	
	White	Negro	White	Negro	White	Negro
Both sexes	Rate per 100 children					
6 years	3.8	7.2	1.9	9.5	5.1	12.3
7 years	4.1	13.9	2.5	7.0	4.8	9.5
8 years	4.2	9.4	2.1	1.6	6.3	5.1
9 years	5.0	5.9	2.5	8.5	6.7	8.6
10 years	4.1	3.6	2.8	6.0	5.8	9.8
11 years	4.8	5.0	4.2	7.2	5.9	8.2
Both sexes, 6-11 years	4.3	7.6	2.7	6.6	5.8	8.9
Boys, 6-11 years	5.0	9.4	3.0	6.2	6.4	8.9
Girls, 6-11 years	3.7	5.8	2.3	7.1	5.1	8.9
	Standard error					
Both sexes, 6-11 years	1.22	2.72	0.55	2.01	1.36	2.90
Boys, 6-11 years	1.46	3.93	0.66	2.07	1.56	2.95
Girls, 6-11 years	1.05	1.80	0.52	2.27	1.30	2.98

Table 12. Prevalence rates for cardiovascular conditions from diagnostic impression among children in 1963-1965 and youths in 1966-1970, by age, sex, race, geographic region, urban or rural place of residence, annual family income and education of parent, with standard errors for totals: United States

Age and sex	Race		Region				Place of residence		Annual family income			Parent education			
	White	Negro	North-east	Mid-west	South	West	Urban	Rural	Under $5,000	$5,000-$9,999	$10,000 or over	Less than 5 years	5-8 years	9-12 years	13 years or more
	Cardiovascular prevalence rates per 100 persons														
Both sexes															
6 years	2.1	4.2	2.2	1.2	5.8	1.0	2.0	3.4	2.9	2.6	1.7	2.9	3.1	2.3	1.6
7 years	2.4	4.6	4.2	2.4	3.6	1.0	2.3	3.7	2.7	3.4	1.4	2.1	2.8	3.5	1.3
8 years	2.2	6.2	3.4	1.6	5.2	1.4	2.5	3.4	3.9	1.9	3.0	5.1	3.2	2.4	2.2
9 years	1.5	5.1	2.6	0.9	3.8	0.8	1.6	2.6	3.1	1.4	1.6	8.0	2.7	1.0	1.7
10 years	2.2	1.4	2.2	2.0	3.2	1.1	2.1	2.2	1.9	2.3	2.5	3.8	1.3	2.9	0.7
11 years	2.0	3.7	3.4	1.7	3.1	1.0	1.5	3.8	3.9	1.3	1.0	3.4	2.2	1.8	3.0
12 years	3.0	8.1	1.9	2.0	9.4	2.3	3.4	4.2	7.2	2.9	1.9	6.2	2.9	4.5	2.0
13 years	4.0	4.7	3.9	2.6	7.9	2.6	3.7	4.8	5.3	3.2	3.9	7.3	4.3	4.1	2.9
14 years	5.4	6.5	3.3	4.0	11.9	3.4	4.0	8.2	7.4	5.3	4.6	11.9	4.9	4.6	6.1
15 years	4.4	3.5	5.4	3.0	5.9	3.1	4.1	4.6	5.2	4.6	2.6	6.8	4.8	4.0	4.0
16 years	5.2	8.9	4.8	4.6	9.0	4.2	6.5	4.2	8.0	5.7	4.5	5.3	2.6	7.8	4.2
17 years	5.0	1.9	3.8	5.7	6.2	2.5	4.5	4.8	7.0	2.9	4.4	3.1	6.0	4.8	3.4
6-11 years	2.1	4.2	3.0	1.7	4.1	1.0	2.0	3.2	3.0	2.2	1.9	4.2	2.5	2.3	1.7
12-17 years	4.5	5.7	3.8	3.6	8.4	3.0	4.3	5.1	6.6	4.1	3.6	6.9	4.3	4.9	3.7
Boys															
6-11 years	2.4	2.7	3.8	1.8	4.1	0.7	2.0	3.5	2.7	2.3	2.6	3.6	2.5	2.5	1.8
12-17 years	4.9	4.9	4.0	4.0	9.0	2.8	4.6	5.4	5.4	4.7	4.9	5.7	4.2	5.2	4.8
Girls															
6-11 years	1.7	5.8	2.3	1.8	4.1	1.4	2.0	2.9	3.4	2.0	1.0	4.8	2.5	2.1	1.6
12-17 years	4.0	6.5	3.5	3.2	7.8	3.2	4.1	4.8	7.8	3.4	2.3	8.0	4.3	4.5	2.6
	Standard error														
Both sexes															
6-11 years	0.27	0.65	0.70	0.49	0.56	0.39	0.26	0.53	0.86	0.32	0.50	1.38	0.39	0.31	0.43
12-17 years	0.68	1.27	1.07	1.02	2.21	0.56	0.53	1.38	1.23	1.08	0.99	2.83	0.81	0.69	1.17
Boys															
6-11 years	0.40	1.51	1.00	0.71	1.03	0.37	0.33	0.81	1.06	0.52	0.63	1.75	0.58	0.48	0.50
12-17 years	0.88	1.29	1.34	1.14	2.66	0.84	0.69	1.70	1.23	1.43	1.20	2.47	1.07	0.89	1.59
Girls															
6-11 years	0.27	0.91	0.50	0.62	0.58	0.57	0.29	0.45	1.31	0.30	0.51	1.22	0.52	0.26	0.61
12-17 years	0.63	1.44	0.90	1.01	2.09	1.07	0.56	1.33	2.60	0.91	0.67	3.66	0.87	0.69	0.83

Table 13. Prevalence rates for cardiovascular conditions from diagnostic impression among white and Negro children in 1963-1965 and youths in 1966-1970, by geographic region, urban or rural place of residence, annual family income, age, and sex, with standard errors for totals: United States

Age and sex	Region								Place of residence				Annual family income					
	Northeast		Midwest		South		West		Urban		Rural		Under $5,000		$5,000-$9,999		$10,000 or over	
	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro
	Cardiovascular prevalence rate per 100 persons																	
Both sexes																		
6 years	2.1	3.2	1.0	4.0	5.7	6.0	0.7	-	2.0	2.1	2.3	12.4	2.7	3.4	2.2	5.6	1.2	63.6
7 years	3.3	9.0	2.4	3.0	3.1	4.6	1.1	-	1.5	5.3	3.9	2.0	1.8	5.2	3.2	4.1	1.4	-
8 years	3.0	6.7	1.5	2.6	4.2	7.6	1.0	5.8	1.8	5.4	2.9	10.3	2.9	6.5	1.7	3.6	3.0	-
9 years	3.0	-	0.6	4.5	2.4	6.9	0.5	5.6	1.4	3.1	1.8	13.0	1.6	6.6	1.4	1.9	1.6	-
10 years	2.5	-	2.2	-	3.3	3.2	1.2	-	2.1	1.8	2.4	-	1.9	2.0	2.5	-	2.6	-
11 years	4.0	-	1.6	3.5	2.3	5.6	0.7	3.8	1.4	2.1	3.2	10.3	3.3	5.5	1.5	-	1.0	-
12 years	1.8	2.6	1.6	5.8	7.7	13.7	2.2	2.8	2.2	8.8	4.1	5.3	5.0	12.1	3.1	1.0	1.7	7.1
13 years	3.8	4.4	2.8	-	8.3	7.0	2.8	-	3.9	2.9	4.3	9.9	4.8	6.5	3.6	-	4.0	-
14 years	3.8	-	3.8	6.0	12.6	9.9	2.9	4.7	4.1	3.9	7.4	14.8	7.4	7.5	5.4	2.0	4.8	-
15 years	6.1	-	3.4	-	5.5	7.2	3.4	-	4.8	0.6	3.8	15.1	5.6	4.2	5.0	1.6	2.7	-
16 years	5.1	2.9	4.3	8.1	7.3	13.8	4.6	-	6.0	9.1	3.8	8.4	5.9	12.9	6.0	0.3	4.6	-
17 years	4.4	-	5.9	3.8	7.6	1.7	2.5	3.0	5.2	0.8	4.7	5.9	9.8	1.3	2.9	29.6	4.4	5.1
6-11 years	3.0	3.2	1.6	2.8	3.5	5.7	0.9	2.4	1.7	3.3	2.8	7.9	2.4	4.8	2.1	2.5	1.8	11.0
12-17 years	4.1	1.8	3.6	4.1	8.2	9.0	3.1	2.0	4.3	4.5	4.7	10.0	6.3	7.4	4.3	1.8	3.7	2.5
Boys																		
6-11 years	3.8	3.4	2.0	-	4.1	4.2	0.6	-	2.1	1.6	3.1	7.0	2.6	3.0	2.3	1.5	2.5	19.9
12-17 years	4.5	-	4.1	3.7	9.2	8.3	2.9	1.1	4.8	3.8	5.0	8.8	5.2	6.0	4.9	2.1	5.0	3.1
Girls																		
6-11 years	2.1	3.1	1.2	5.7	2.9	7.4	1.2	4.6	1.3	5.1	2.4	8.9	2.2	6.6	1.8	3.6	1.0	-
12-17 years	3.6	3.2	3.1	4.6	7.1	9.8	3.3	3.0	3.9	5.2	4.3	11.3	7.3	8.9	3.6	1.4	2.3	2.0
	Standard error																	
Both sexes																		
6-11 years	0.83	1.61	0.52	1.40	0.40	1.35	0.34	4.98	0.26	0.51	0.50	2.80	0.40	0.92	0.32	1.49	0.68	11.31
12-17 years	1.22	0.48	1.05	2.02	2.39	2.21	0.64	1.16	0.54	1.00	1.23	5.27	1.38	1.21	0.79	0.76	0.84	2.11
Boys																		
6-11 years	1.19	1.96	0.76	-	0.64	3.35	0.31	-	0.35	0.89	0.77	5.84	0.53	1.40	0.38	2.48	1.01	19.59
12-17 years	1.54	-	1.22	1.94	3.09	2.07	0.70	1.08	0.72	1.00	1.68	4.85	1.91	1.45	0.95	0.93	1.30	3.17
Girls																		
6-11 years	0.50	1.41	0.50	2.99	0.61	1.12	0.46	8.45	0.25	0.80	0.48	1.82	0.71	1.18	0.60	1.95	0.65	-
12-17 years	1.05	1.00	1.03	2.44	2.13	2.57	1.11	2.75	0.56	1.15	1.06	5.95	1.67	1.64	0.78	1.21	0.69	3.10

Table 14. Prevalence rates for major types of cardiovascular conditions from diagnostic impression among youths age 12-17 years, by race, geographic region, urban or rural place of residence, annual family income, and sex, with standard errors: United States, 1966-1970

Cardiovascular condition (diagnostic impression) and sex	Race		Region				Place of residence		Annual family income		
	White	Negro	North-east	Mid-west	South	West	Urban	Rural	Under $5,000	$5,000-$9,999	$10,000 or over
	Rate per 100 youths										
Rheumatic heart disease											
Both sexes	1.0	1.2	0.4	1.2	1.6	0.7	1.0	1.1	1.3	0.9	1.0
Boys	1.1	0.6	0.4	1.4	1.6	0.6	1.0	1.2	1.1	0.9	1.2
Girls	0.8	1.8	0.4	1.1	1.7	0.8	1.0	1.0	1.4	0.8	0.9
Hypertensive heart disease											
Both sexes	0.6	0.8	0.9	0.7	0.7	0.2	0.7	0.5	0.8	0.6	0.7
Boys	0.6	1.2	0.8	0.6	0.9	0.3	0.8	0.3	0.6	0.6	0.8
Girls	0.6	0.6	1.0	0.8	0.5	0.2	0.6	0.6	0.9	0.5	0.6
Congenital heart disease											
Both sexes	0.4	0.3	0.3	0.6	0.4	0.2	0.3	0.5	0.6	0.2	0.4
Boys	0.5	-	0.4	0.5	0.2	0.4	0.3	0.6	0.2	0.1	0.6
Girls	0.4	0.6	0.2	0.6	0.7	0.1	0.4	0.4	0.9	0.2	0.1
Other heart disease											
Both sexes	2.5	3.2	2.2	1.2	5.5	1.7	2.3	3.1	3.9	2.5	1.6
Boys	2.8	3.0	2.5	1.7	6.0	1.5	2.5	3.3	3.4	3.0	2.5
Girls	2.2	3.4	1.9	0.7	4.9	2.0	2.0	2.8	4.4	1.9	0.7
	Standard error—both sexes										
Rheumatic heart disease	0.15	0.32	0.19	0.45	0.36	0.29	0.21	0.24	---	---	---
Hypertensive heart disease	0.15	0.44	0.38	0.34	0.33	0.15	0.18	0.22	---	---	---
Congenital heart disease	0.11	0.15	0.17	0.27	0.13	0.15	0.09	0.23	---	---	---
Other heart disease	0.55	1.04	1.07	0.43	2.01	0.54	0.41	1.11	---	---	---

Table 15. Prevalence rates for major types of cardiovascular conditions from diagnostic impression among white and Negro youths age 12-17 years, by geographic region, urban or rural place of residence, and sex, with standard errors: United States, 1966-1970

Cardiovascular condition (diagnostic impression) and sex	Region								Place of residence			
	Northeast		Midwest		South		West		Urban		Rural	
	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro
	Rate per 100 youths											
Rheumatic heart disease												
Both sexes	0.3	1.0	1.2	2.1	1.8	1.2	0.7	0.8	1.0	1.1	1.0	1.8
Boys	0.5	-	1.3	2.8	2.1	0.3	0.6	-	1.0	0.8	1.2	-
Girls	0.1	1.7	1.0	1.2	1.5	2.1	0.8	1.7	0.9	1.4	0.8	3.7
Hypertensive heart disease												
Both sexes	1.0	0.5	0.7	0.6	0.4	2.0	0.2	-	0.7	0.8	0.4	0.9
Boys	0.8	-	0.7	-	0.3	3.5	0.3	-	0.8	1.0	0.2	1.7
Girls	1.1	0.8	0.7	1.2	0.5	0.6	0.2	-	0.6	0.7	0.7	-
Congenital heart disease												
Both sexes	0.3	-	0.6	0.5	0.5	0.4	0.3	-	0.3	0.4	0.6	-
Boys	0.5	-	0.6	-	0.3	-	0.4	-	0.3	-	0.7	-
Girls	0.2	-	0.6	1.1	0.7	0.8	0.1	-	0.3	0.7	0.5	-
Other heart disease												
Both sexes	2.5	0.4	1.2	1.0	5.4	5.7	1.8	1.2	2.4	2.0	2.7	7.3
Boys	2.8	-	1.8	0.9	6.3	5.4	1.5	1.1	2.7	1.8	3.0	7.1
Girls	2.1	0.7	0.7	1.1	4.4	6.0	2.1	1.2	2.0	2.2	2.4	7.6
	Standard error—both sexes											
Rheumatic heart disease	0.16	0.60	0.40	1.32	0.46	0.45	0.29	0.70	0.22	0.30	0.20	0.72
Hypertensive heart disease	---	0.52	---	0.53	---	1.28	---	-	0.19	0.42	0.23	0.90
Congenital heart disease	0.20	-	0.30	0.51	0.16	0.24	0.17	-	0.10	0.13	0.25	-
Other heart disease	1.19	0.62	0.45	0.67	2.12	2.12	0.59	0.61	0.40	---	0.97	---

APPENDIXES

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APPENDIX I

STATISTICAL NOTES

Survey Design

The sample designs for the first three programs (Cycles I-III) of the Health Examination Survey have been essentially similar in that each has been a multistage, stratified probability sample of clusters of households in land-based segments. The successive elements for this sample design are the primary sampling unit (PSU), census enumeration district (ED), segment (a cluster of households), eligible person, and, finally, the sample person.

The same 40 sample areas and the same segments were utilized in the design of both Cycles II and III. Previous reports describe in detail the sample design used for Cycle II and, in addition, discuss the problems of and considerations given to other types of sampling frames, cluster versus random sampling, and whether or not to control the selection of siblings.[4, 20]

Requirements and limitations placed on the design for both Cycles II and III were that:

The target population be defined as the civilian noninstitutionalized population of the United States, including Alaska and Hawaii, of ages 6-11 years for Cycle II and 12-17 years for Cycle III, with the special exclusion of children residing on reservation lands of the American Indians. The latter exclusion was due to operational problems encountered on these lands in Cycle I.

The time period of data collection be limited to about 3 years for each cycle and the length of the individual examination within the specially constructed mobile examination center be between 2 and 3 hours.

Ancillary data be collected on specially designed household, medical history, and school questionnaires and from birth certificate copies.

Examination objectives be primarily related to factors of physical and intellectual growth and development.

The sample be sufficiently large to yield reliable findings within broad geographic regions and population density groups as well as age, sex, and limited socioeconomic groups for the total sample.

The sample was drawn jointly with the U.S. Bureau of the Census, starting with the 1960 decennial census list of addresses and the nearly 1,900 PSU's into which the entire United States was divided. Each PSU is either a standard metropolitan statistical area (SMSA), a county, or a group of two or three contiguous counties. These PSU's were grouped into 40 strata, each stratum having an average size of about 4.5 million persons, in such a manner as to maximize the degree of homogeneity within strata with regard to the population size of the PSU's, degree of urbanization, geographic proximity, and degree of industrialization. The 40 strata were than classified into four broad geographic regions of 10 strata each and then within each region cross-classified by four population-density classes and classes of rate of population change from 1950 to 1960. Using a modified Goodman-Kish controlled-selection technique, one PSU was drawn from each of the 40 strata.

NOTE: A list of references follows the text.

Further stages of sampling within PSU's required first the selection of ED's, which are small, well-defined areas of about 250 housing units into which the entire Nation was divided for the 1960 population census. Each ED was assigned a "measure of size" equal to the rounded whole number resulting from a "division by nine" of the number of children age 5-9 years in the ED at the time of the 1960 census. A sample of 20 ED's in the sample PSU were selected by systematic sampling with each ED having a probability of selection proportional to the population of children age 5-9 years at the time of the 1960 census date. A further random selection by size of segments (smaller clusters of housing units) within each ED was then made.

Because of the 3-year time interval between Cycle II and Cycle III, the Cycle III frame had to be supplemented for new construction and to compensate for segments in which housing was partially or totally demolished to make room for highway construction or urban redevelopment.

Advanced planning for the examinations at the various locations or stands provided for about 17 days of examinations, which limited the number of examinees per location to approximately 200. When the number of eligible children or youths in the sample drawn for a particular location exceeded this number, subsampling was done by deleting from the master list of eligible children or youths (ordered by segment, household order within segment, and age within household) every nth name on the list starting with the yth name, y being a number between 1 and n selected randomly and n being the extent of oversampling in the original draw.

In both Cycles II and III, twins who were deleted in the sample selection were also scheduled for examination if time permitted, as were youths deleted from the Cycle III sample who had been examined in Cycle II.

In both Cycles II and III, the sample was selected to contain the correct proportion of children from families having only one eligible child, two eligible children, and so on, to be representative of the total target population. However, since households were one of the elements in the sample frame, the number of related children or youths in the resultant sample is greater than would come from a design which sampled children aged 6-11 or 12-17 years without regard to household. The resultant estimated mean measurements or rates should be unbiased but their sampling variability will be somewhat greater than those from a more costly, time-consuming, systematic, sample design in which every kth child would be selected.

The total probability sample for Cycle II contained 7,417 children representative of the approximately 24 million children 6-11 years of age in the U.S. target population at the time of the survey; Cycle III included 7,514 youths similarly representative of the approximately 22.7 million noninstitutionalized youths of 12-17 years in the United States. Each of these two samples contained approximately 1,000 children (or youths) in each single year of age and from 25 different States.

The response rates in Cycles II and III were 96 and 90 percent, respectively, with 7,119 children and 6,768 youths examined out of the total sample. Both groups of examinees were closely representative of their respective samples as well as of the population from which the samples were drawn with respect to age, sex, race, geographic region, population density, and population growth in the area of residence. Hence it appears unlikely that nonresponse could bias the findings appreciably.

Measures used to control the quality of the data from these surveys have been cited previously;[4,5,21] those additional measures specifically related to the particular examinations, tests, or measurements are outlined in the analytic reports describing and presenting the respective initial findings.

Reliability

While measurement processes in the surveys were carefully standardized and closely controlled, the correspondence between the real world and survey results cannot be expected to be exact. Survey data are imperfect for three major reasons: Results are subject to sampling error, the actual conduct of a survey never agrees perfectly with the design, and the measurement processes themselves are inexact even though standardized and controlled.

The first reports on Cycle II[4] and III[5] describe in detail the faithfulness with which the sampling design was carried out.

Data recorded for each sample child and

youth are inflated in the estimation process to characterize the larger universe of which the sample child or youth is representative. The weights used in this inflation process are a product of the reciprocal of the probability of selecting the child or youth, an adjustment for nonresponse cases, and a poststratified ratio adjustment that increases precision by bringing survey results into closer alignment with known U.S. population figures by color and sex within single years of age 6-11 for the children's survey and age 12-17 for the youths' survey.

In Cycles II and III of the Health Examination Survey, the samples were the result of three principal stages of selection—the single PSU from each stratum, the 20 segments from each sample PSU, and the sample children and youths from the eligible persons. The probability of selecting an individual child or youth is the product of the probability of selection at each stage.

Since the strata are roughly equal in population size and a nearly equal number of sample children or youths were examined in each of the sample PSU's, the sample design is essentially self-weighting with respect to the target population; that is, each child 6-11 years old and youth 12-17 years had about the same probability of being drawn into the respective samples.

The adjustment upward for nonresponse is intended to minimize the impact of nonresponse on final estimates by imputing to nonrespondents the characteristics of "similar" respondents. Here "similar" respondents were judged to be examined children or youths in a sample PSU having the same age in years and the same sex as children or youths not examined in that sample PSU.

The poststratified ratio adjustment used in the second and third cycles achieved most of the gains in precision that would have been attained if the sample had been drawn from a population stratified by age, color, and sex and made the final sample estimates of population agree exactly with independent controls prepared by the Bureau of the Census for the U.S. noninstitutionalized population as of August 1, 1964 (approximate midsurvey point for Cycle II) by color and sex for each single year of age 6-11; and similarly as of March 9, 1968 (approximate midsurvey point for Cycle III) for each single year of age 12-17. The weights of every responding sample child and youth in each of the 24 age, color, and sex classes is adjusted upward or downward so that the weighted total within the class equals the independent population control for each survey.

In addition to children or youths not examined at all, there were some whose examination was incomplete in one procedure or another. The extent of missing data for the part of the examination and selected items in the medical history relevant to this report is shown in table I.

No imputation was made for those items missing for the examined children and youths.

Table I. Number of examinees by extent of selected missing items on physical examination and in the medical history and by age and sex: Health Examination Surveys, 1963-1965 and 1966-1970

Age and sex	Questionnaire item or examination missing		
	Health status	Health a worry	Physical examination
	Number of examinees		
Both sexes, 6-11 years	9	38	6
Boys, 6-11 years	3	21	2
Girls, 6-11 years	6	17	4
Both sexes, 6-11 years	9	38	6
6 years	2	8	1
7 years	-	6	1
8 years	1	5	1
9 years	3	5	-
10 years	2	5	1
11 years	1	9	2
Both sexes, 12-17 years ..	43	43	3
Boys, 12-17 years	26	27	-
Girls, 12-17 years	17	16	3
Both sexes, 12-17 years ..	43	43	3
12 years	5	5	-
13 years	12	12	-
14 years	6	7	-
15 years	7	7	-
16 years	5	5	1
17 years	8	7	2

In effect, it has been assumed that the distribution of the individual characteristic is similar among those for whom the information was available and those for whom it was not.

Sampling and Measurement Error

In the present report, reference has been made to efforts to minimize bias and variability of measurement techniques.

The probability design of the survey makes possible the calculation of sampling errors. The sampling error is used here to determine how imprecise the survey test results may be because they come from a sample rather than from the measurement of all elements in the universe.

The estimation of sampling errors for a study of the type of the Health Examination Survey is difficult for at least three reasons: Measurement error and "pure" sampling error are confounded in the data—it is not easy to find a procedure that will either completely include both or treat one or the other separately, the survey design and estimation procedure are complex and accordingly require computationally involved techniques for the calculation of variances, and from the survey are coming thousands of statistics, many for subclasses of the population for which there are a small number of cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error which may be large when the number of cases in a cell is small or even occasionally when the number of cases is substantial.

Estimates of approximate sampling variability for selected statistics used in this report are included in the detailed tables. These estimates have been prepared by a replication technique that yields overall variability through observation of variability among random subsamples of the total sample. The method reflects both "pure" sampling variance and a part of the measurement variance.

In accordance with usual practice, the interval estimate for any statistic may be considered the range within 1 standard error of the tabulated statistic with 68-percent confidence, or the range within 2 standard errors of the tabulated statistic with 95-percent confidence. The latter is used as the level of significance in this report.

An approximation of the standard error of a difference $d = x - y$ of two statistics x and y is given by the formula

$$S_d = (S_x^2 + S_y^2)^{1/2}$$

where S_x and S_y are the sampling errors, respectively, of x and y. Of course, where the two groups or measures are positively or negatively correlated, this will give an overestimate or underestimate, respectively, of the actual standard error.

Examiner Variability

In the survey among children there were 36 physician examiners and in the survey among youths 41 physician examiners, each following the predetermined standardized procedures for the respective surveys, as previously described. The variability among examiners in the proportion of examinees they rated on diagnostic impression as having a significant cardiovascular

Table II. Number of examiners by percent of examinees they found with significant cardiovascular abnormality in Cycles II and III, with range, mean, median, and quartiles in the distribution of the percent of examinees abnormal: Health Examination Surveys, 1963-1965 and 1966-1970

Percent[1] of examinees with significant cardiovascular abnormality	Cycle II	Cycle III
	Number of examiners	
Less than 1.0 percent	17	5
1.0-2.9 percent	8	14
3.0-4.9 percent	5	6
5.0-6.9 percent	4	6
7.0-8.9 percent	2	4
9.0 percent or more	-	5
	Percent[1] of examinees	
Range	0-9.0	0-23.5
Mean	2.4	4.6
Median	1.5	3.5
P_{25}	0.5	1.5
P_{75}	3.5	6.4

[1]Percents for each examiner have been age-sex adjusted to remove the effect of such differences among those examined by each physician.

NOTE: P_{25} = percent below which one-fourth of examinees fall; P_{75} = percent below which three-fourths of examinees fall.

Table III. Number of examiners by percent of examinees they found with any significant abnormality and the proportion of them with a cardiovascular abnormality in Cycles II and III, with range, mean, median, and quartiles in the distribution of the percent of examinees abnormal: Health Examination Surveys, 1963-1965 and 1966-1970

Percent[1] of examinees with significant abnormality	Any abnormality		Cardiovascular abnormality	
	Cycle II	Cycle III	Cycle II	Cycle III
	Number of examiners			
Less than 10 percent	13	5	13	12
10-19 percent	17	14	11	13
20-29 percent	5	14	6	7
30-39 percent	1	5	2	4
40-49 percent	-	1	-	1
50-59 percent	-	1	-	2
60 percent and over	-	1	2	-
	Percent[1] of examinees		Proportion[1] of abnormals with cardiovascular conditions	
Range	0-37.2	2.8-73.6	0-69.4	0-59.8
Mean	12.3	21.8	19.5	21.2
Median	11.4	20.8	14.4	16.3
P_{25}	7.5	14.0	9.6	8.3
P_{75}	15.0	28.5	33.0	28.0

[1] Data have been age-sex adjusted to remove the effect of such differences among those examined by each physician.

NOTE: P_{25} = percent below which one-fourth of examinees fall; P_{75} = percent below which three-fourths of examinees fall.

abnormality is substantially greater among the youths than the children as shown in table II.

When the effect of any age-sex differences that may exist in the prevalence of such conditions is controlled through indirect adjustment, the proportion of examinees with cardiovascular conditions (on diagnostic impression) ranged from 0 to 9.0 percent per examiner in the children's survey and from 0 to 23.5 percent per examiner in the youths' survey. Seventy percent of the children's examiners rated less than 3 percent of those examined as having a cardiovascular condition compared with 46 percent of the youths' examiners.

While there was also greater variability among the youths' than the children's examiners in the proportion with diagnostic impression of significant abnormality or any type, when the proportion of these with cardiovascular abnormalities is considered, the extent of examiner variability in the two surveys is generally similar (table III).

Small Numbers

In some tables, magnitudes are shown for cells for which the sample size is so small that the sampling error may be several times as great as the statistic itself. Obviously, in such instances, the statistic has no meaning in itself except to indicate that the true quantity is small. Such numbers, if shown, have been included in the belief that they may help to convey an impression of the overall story of the table.

○ ○ ○

APPENDIX II

DEMOGRAPHIC AND SOCIOECONOMIC TERMS

Age.—The age recorded for each child and youth was the age at last birthday on the date of examination. The age criterion for inclusion in the sample used in this survey was defined in terms of age at time of interview. Since the examination usually took place 2 to 4 weeks after the interview, some of those who were 11 years old at the time of the interview became 12 years and some of those who were 17 years old at the time of interview became 18 years old by the time of examination. There were 72 11-year-olds who became 12 years old and 23 17-year-olds who became 18 years old in these samples. In the adjustment and weighting procedures used to produce national estimates, the 72 such children were included with the 11-year-olds and the 23 such youths were included with the 17-year-old group.

Race.—Race was recorded as white, Negro, or other. "Other" included American Indians, Chinese, Japanese, and all races other than white or Negro. Mexican persons were included with "white" unless definitely known to be American Indian or of another nonwhite race. Negroes and persons of mixed Negro and other parentage were recorded as "Negro."

Geographic region.—For purposes of stratification, the United States was divided into four geographic regions of approximately equal population. These regions, which correspond closely to those used by the U.S. Bureau of the Census, were as follows:

Region	*States included*
Northeast	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.
Midwest	Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, and Missouri.
South	Delaware, Maryland, District of Columbia, West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas.
West	Washington, Oregon, California, Nevada, New Mexico, Arizona, Texas, Oklahoma, Kansas, Nebraska, North Dakota, South Dakota, Idaho, Utah, Colorado, Montana, Wyoming, Alaska, and Hawaii.

Urban and rural.—The definitions of urban and rural areas were the same as those used in the 1960 census. According to these definitions, the population in urban areas was comprised of all persons living in (1) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (2) the densely settled urban fringe, whether incorporated or unincorporated of urbanized areas; (3) towns in New England and townships in New Jersey and Pennsylvania that contained no incorporated municipalities as subdivisions and had either 2,500 inhabitants or more, or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile; (4) counties in States other than the New England States, New

Jersey, and Pennsylvania that had no incorporated municipalities within their boundaries and had a density of 1,500 persons or more per square mile; and (5) unincorporated places of 2,500 inhabitants or more not included in any urban fringe. The remaining population was classified as rural.

Urban areas are further classified by population size for places within urbanized areas and other urban places outside urbanized areas.

Education of parent or guardian.—This was recorded as the highest grade completed in school. The only grades counted were those attended in a regular school where persons were given formal education in graded public or private schools, whether day or night school, and whether attendance was full or part time. A "regular" school is one that advances a person toward an elementary certificate or high school diploma, or a college, university, or professional school degree. Education in vocational, trade, or business schools outside the regular school system was not counted in determining the highest grade of school completed.

Family income.—The income recorded was the total income of the past 12 months received by the head of the household and all other household members related to the head by blood, marriage, or adoption. This income was the gross cash income (excluding pay in kind), except in the case of a family with its own farm or business, in which case net income was recorded.

Parent.—A parent was the natural parent or, in the case of adoption, the legal parent of the child.

Guardian.—A guardian was the person responsible for the care and supervision of the child or youth. He or she did not have to be the legal guardian to be considered the guardian for this survey. A guardianship could only exist when the parent(s) of the child or youth did not reside within the sample household.

Head of household.—Only one person in each household was designated as the "head." He or she was the person who was regarded as the "head" by the members of the household. In most cases, the head was the chief breadwinner of the family, although this was not always true. In some cases, the head was the parent of the chief earner or the only adult member of the household.

APPENDIX III

MEDICAL HISTORY AND PHYSICAL EXAMINATION FORMS

SELECTED ITEMS FROM MEDICAL HISTORY OF YOUTH—PARENT'S QUESTIONNAIRE

CONFIDENTIAL – All information which would permit identification of the individual will be held strictly confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to others for any other purposes (22 FR 1687).

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL HEALTH SURVEY

MEDICAL HISTORY OF YOUTH
Parent's Questionnaire

Sample number

NAME OF CHILD *(Last, First, Middle)*	SEGMENT	SERIAL	COL. NO.

NOTE: Please answer the questions by checking the correct boxes or by filling in the blanks, as required. If a question is unclear leave the answer blank and draw a line around the question. A representative of the Public Health Service will collect your filled in questionnaire in a few days and she will help you answer the unclear questions. Thank you for your cooperation.

1. SEX	2. AGE	3. DATE OF BIRTH *(Month, Day, Year)*
1 ☐ Male 2 ☐ Female		

10. Is there anything about his or her health that worries you now?

1 ☐ Yes 2 ☐ No

IF YES: What is it? _____

11. How would you describe his or her present health?

1 ☐ Poor 2 ☐ Fair 3 ☐ Good 4 ☐ Very Good 5 ☐ Excellent

IF POOR OR FAIR: What is the matter? _____

12. Does he or she now use any medicine regularly *(not counting vitamins)*?

1 ☐ Yes 2 ☐ No 3 ☐ Don't know

IF YES:

a. What is the name of the medicine? _____ 2 ☐ Don't know

b. What is it for? _____ 2 ☐ Don't know

c. Did a doctor say he or she should use it?

1 ☐ Yes 2 ☐ No 3 ☐ Don't know

d. How long has he or she been using it? _____

18. Has he or she ever had (CHECK YES OR NO IN EVERY LINE).

a. Measles	1 ☐ Yes	2 ☐ No
b. Mumps	1 ☐ Yes	2 ☐ No
c. Chickenpox	1 ☐ Yes	2 ☐ No
d. Whooping cough	1 ☐ Yes	2 ☐ No
e. Scarlet fever	1 ☐ Yes	2 ☐ No
f. Asthma	1 ☐ Yes	2 ☐ No
g. Hay fever	1 ☐ Yes	2 ☐ No
h. Other allergies	1 ☐ Yes	2 ☐ No
i. Kidney trouble	1 ☐ Yes	2 ☐ No
j. Heart murmur or anything else wrong with the heart	1 ☐ Yes	2 ☐ No
k. Fit, convulsion, or seizure	1 ☐ Yes	2 ☐ No
l. Pneumonia	1 ☐ Yes	2 ☐ No

20. What is the most serious illness or disease he or she has ever had?

_____

a. How old was he or she when it started?_____ years

b. What did the doctor say about it?

The doctor said it was:

1 ☐ a mild case
2 ☐ a moderate case
3 ☐ a severe (critical) case
4 ☐ I don't remember what he said
5 ☐ No doctor saw the child

c. Did the illness (disease) leave any lasting effects?

1 ☐ Yes 2 ☐ No 3 ☐ Hard to say

IF YES: What were or are they?_____

36. Is he or she now prevented for reasons of health from taking part in hard exercise or play?

1 ☐ Yes x ☐ No (IF NO, GO ON TO QUESTION 37)

IF YES:

a. What are the reasons?_____

_____

b. Did the doctor advise this?

1 ☐ Yes 2 ☐ No

SELECTED ITEMS FROM HEALTH HABITS AND HISTORY—YOUTH (QUESTIONNAIRE)

CONFIDENTIAL – All information which would permit identification of the individual will be held strictly confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to others for any other purposes (22 FR 1687).

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL HEALTH SURVEY

Sample No.

HEALTH HABITS AND HISTORY – Youth

Name (Last, First, Middle)	SEGMENT	SERIAL	COL. NO.

INSTRUCTIONS: On the following pages you will find a set of questions dealing with your health. Since every person is different, there are no "standard" answers to the questions; just answer them as fully and honestly as you can. Your answers will be kept confidential. Do your best to pick the most likely answer from among the choices given. Only if you really don't know the answer check "Don't know." WHEN YOU HAVE COMPLETED THE QUESTIONNAIRE, PLEASE MAIL IT BACK TO THE SURVEY IN THE ENVELOPE WE LEFT WITH YOU –THERE IS NO POSTAGE NECESSARY IF YOU USE OUR ENVELOPE.

1. SEX	2. AGE	3. DATE OF BIRTH (Month, Day, Year)
1 ☐ Male 2 ☐ Female		

23. Have you ever been prevented <u>for reasons of health</u> from taking part in hard *(physical)* work, exercise, or games?

1 ☐ Yes x ☐ No

<u>IF YES:</u>

a. Why? _____

b. Did a doctor advise this?

1 ☐ Yes 2 ☐ No 3 ☐ Don't know

c. Are you <u>now</u> forbidden to do some of these things?

1 ☐ Yes 2 ☐ No

SELECTED ITEMS FROM THE PHYSICAL EXAMINATION FORM

Diagnostic Impressions (Examination of Child)

HEALTH EXAMINATION SURVEY—II

CARD COL. **DIAGNOSTIC IMPRESSIONS** CARD 09-3

(54) HEART DISEASE 1 ☐ Yes 2 ☐ No

Diagnostic Impression .....

.....

(55) 1 ☐ Congenital 2 ☐ Acquired .....

FINDINGS: ☐ History ☐ Thrill ☐ Murmur

☐ ECG ☐ X-ray ☐ Other

SUMMARY FOR MEDICAL REPORT TO PARENT OR PRIVATE PHYSICIAN:

A. ☐ None found

B. ACUTE CONDITION (Reported to parent) .....

.....

C. CONDITION (To be reported to private physician) .....

DIAG. IMPRESS.

(79-80) END CARD 09 | SIGNATURE

Summary of Diagnostic Impressions (Examination of Youth)

HEALTH EXAMINATION SURVEY—III

SUMMARY OF DIAGNOSTIC IMPRESSIONS

× ☐ Essentially a normal child with none of the findings below.

List all significant findings

CARDIOVASCULAR SYSTEM

1 ☐ NO FINDINGS

2 ☐ FINDINGS → List and Describe (include ECG and X-ray findings if noted):

DIAGNOSTIC IMPRESSION

OTHER SYSTEMS

1 ☐ NO FINDINGS

2 ☐ FINDINGS (Describe)

DIAGNOSTIC IMPRESSION

SELECTED ITEMS FROM CHILD'S MEDICAL HISTORY–PARENT (QUESTIONNAIRE)

Recording and History Forms

CONFIDENTIAL – *The National Health Survey is authorized by Public Law 652 of the 84th Congress (70 Stat. 489; 42 U.S.C. 242c). All information which would permit identification of the individual will be held strictly confidential, will be used only by persons engaged in and for the purposes of the survey and will not be disclosed or released to others for any other purposes (22 FR 1687).*

FORM APPROVED
BUDGET BUREAU NO. 68-R820-64.6

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL HEALTH SURVEY

HES-256

(1-5) _____

CHILD'S MEDICAL HISTORY - Parent

NAME OF CHILD *(Last, First, Middle)* (6-11)	SEGMENT	SERIAL	COL. NO.

NOTE: Please complete this form by checking the correct boxes and/or filling in the blanks where applicable. When you have completed it, keep it until the representative of the Health Examination Survey calls on you within a few days. If there are some questions you do not understand, please complete the others and the person who comes for the form will help you with the ones that were unclear.

(12-14) 1. SEX	2. AGE	3. DATE OF BIRTH *(Month, Day, Year)*
1 ☐ Male 2 ☐ Female		

20. NOW TURNING TO THE PRESENT TIME. HOW WOULD YOU DESCRIBE THE CHILD'S HEALTH NOW?
1 ☐ Very good 2 ☐ Good 3 ☐ Fair 4 ☐ Poor
IF FAIR or POOR, what is the trouble?_____

21. IS THERE ANYTHING ABOUT HIS(HER) HEALTH THAT BOTHERS YOU OR WORRIES YOU NOW?
1 ☐ Yes 2 ☐ No
IF YES, what is the trouble?_____

32. HERE IS A LIST OF DISEASES THAT CHILDREN SOMETIMES HAVE. HAS THIS CHILD EVER HAD:

		If yes, about how old at the time?		
(63)	A. Scarlet fever?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
(64)	B. Rheumatic fever?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	C. Polio?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	D. Diphtheria?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	E. Meningitis or sleeping sickness?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	F. Tuberculosis?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	G. Diabetes or sugar diabetes?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	H. Epilepsy?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	I. Chorea or St. Vitus dance?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
	J. Cerebral palsey?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know
(63)	K. Whooping cough?	1 ☐ Yes → Age_____	2 ☐ No	3 ☐ Don't know

35. HERE ARE SOME OTHER KINDS OF ILLNESSES OR CONDITIONS SOME CHILDREN HAVE. HAS YOUR CHILD EVER HAD:

(9)

A. Asthma?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
B. Hay fever?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
C. Any other kinds of allergies?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
D. Any trouble with his (her) kidneys?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
E. A heart murmur?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
F. Anything wrong with his(her) heart?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
G. A convulsion?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know
H. A fit?	1 ☐ Yes	2 ☐ No	3 ☐ Don't know

36. DOES YOUR CHILD OFTEN HAVE BAD SORE THROATS?

(14) 1 ☐ Yes 2 ☐ No 3 ☐ Don't know

53. HAS THE CHILD'S HEALTH EVER KEPT HIM(HER) FROM HARD EXERCISE OR PLAY?

1 ☐ Yes 2 ☐ No 3 ☐ Don't know

IF YES:

A. Did a doctor say he should be kept from doing this?

1 ☐ Yes 2 ☐ No 3 ☐ Don't know

B. What was the condition that restricted the child? _____

C. Is he(she) restricted this way at present?

(49) 1 ☐ Yes 2 ☐ No 3 ☐ Don't know

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